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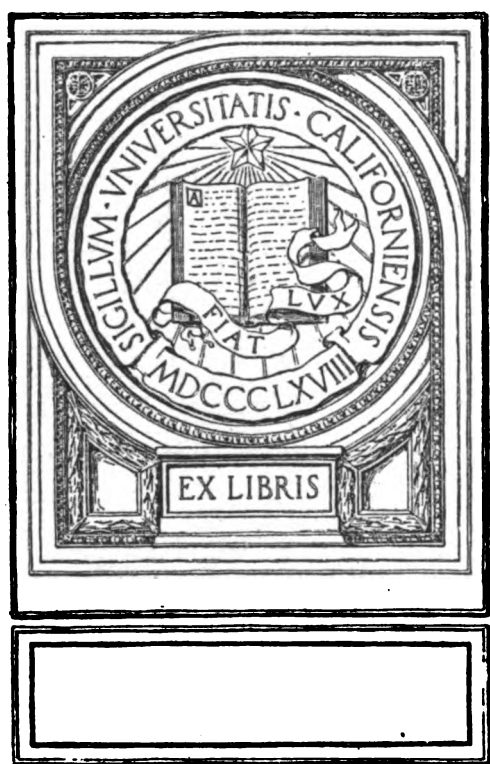
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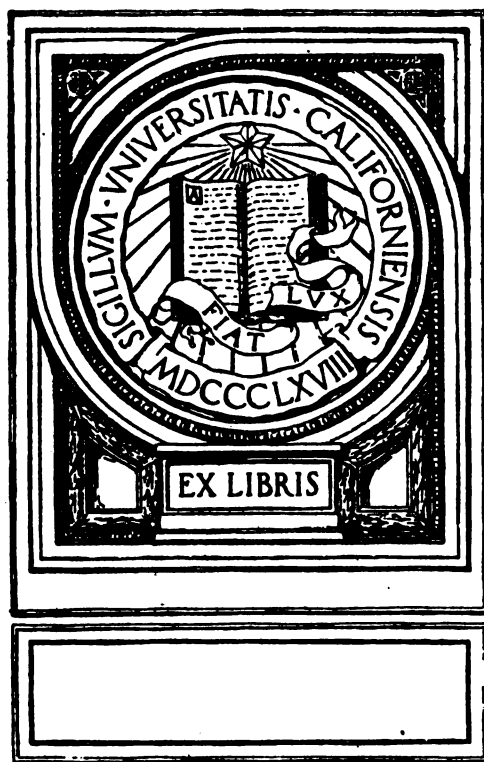
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The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

Vol. V

Pawtucket, R. I., January, 1914.

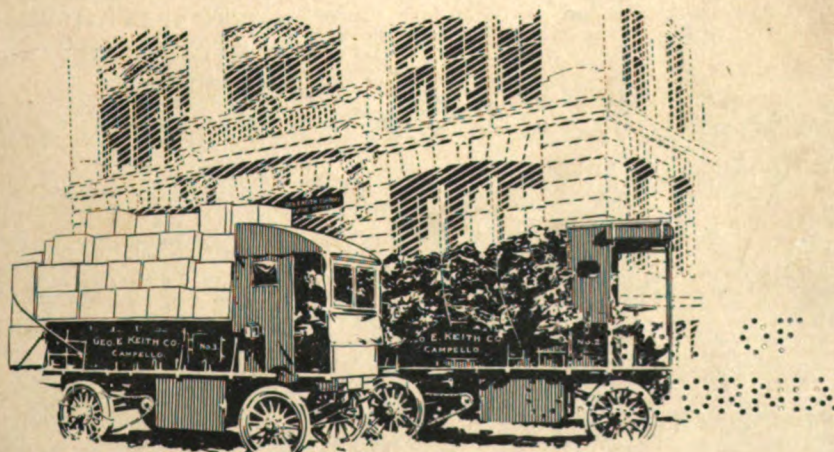
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The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., JANUARY, 1914

No. 1

FREIGHTING OYSTERS AT EXPRESS RATES.

Two Peerless Trucks Make Round Trip of 130 Miles Daily Between Warren, R. I., and Boston, Giving Better Service Than the Railroads and Materially Improving the Business of the Wholesale Shellfish Dealers.

MAKING a daily mileage of 130 in the haulage of oysters between Warren, R. I., and Boston for five days each week, and competing directly with the Adams Express Company, two Peerless trucks owned by Frank Cotrone & Co., Providence, R. I., have been driven more than 11,000 miles each since Sept. 1, 1913, and the freights have been delivered before the beginning of business to all the consignees, with the exception of three days when the machines were slightly delayed en route.

This is probably the longest daily haul made in America, and one of the best demonstrations ever made of the use of machines in direct competition with

tion and resources of one of the largest public service corporations of the country.

The real possibilities with the use of trucks have been very well established, but it should be understood that with greater experience and knowledge of conditions economies can be attained that would minimize expense and insure a larger measure of profit. Obviously a man who had been doing general contract haulage work could not turn to transportation of this character and at once realize the greatest productiveness, for this must result from study of every aspect and careful observation of every phase of operating and the general requirements of the customers.



The Motor Trucks Owned by Frank Cotrone & Co., at the Garage in Globe Street, Providence, R. I., in Readiness for the Collecting Trip to Warren.

the most efficient public service that is afforded the people. There are those who assume that motor trucks can be utilized to excellent advantage for haulage that is too severe for animal vehicles, and that they are practical for the conveyance of freight for distances from 20 to 40 miles where the demands are for quicker service than can be afforded by the usual facilities of the average steam railroad, but comparatively few believe that these machines can be operated to serve the people with greater regularity and more satisfactory results than is possible with the organiza-

Warren, R. I., is known to comparatively few, no doubt, but there is not a person with epicurean tastes who does not know that the finest oysters of America are those grown in Warren river, at its confluence with Narragansett bay, where the conditions are such as to cause them to grow to large size without becoming tough and where a flavor is imparted that is unequalled in oysters grown elsewhere. "Warren river fancies" are specially grown and are in great demand, being sold to the best hotels, cafes, clubs and the like. The supply is limited, and for this reason those who



Four-Ton Peerless Truck That Has Been Driven Nearly 11,000 Miles in Four Months, Carrying Oysters Between Warren, R. I., and Boston, a Round Trip of 130 Miles.

control oyster growing in the comparatively small Warren river beds cannot only dispose of all that can be dredged, but can command high prices. Oyster growing is an industry of considerable proportions in Warren, and along the river are the wharves and houses of companies that carry on oyster culture with system and scientific methods. The oyster growers have developed markets comparatively near, and aside from the towns and cities within a radius of 25 miles the bulk of the yield is sold in Boston.

Warren River Oysters.

Oysters are sold in the shell, as taken from the water, and "opened". The unopened oyster can be kept several days with care, and some of the Warren river crop is shipped in the shell and opened as used, but a very considerable part of the yield is opened and the flesh and liquor sent to market ready for use as food. Only when the oyster is to be served in the shell or "fresh-opened" is it shipped unopened. While the shell oyster is the better preserved and retains its flavor and delicacy, there is little loss in quality of the opened oyster if used within a reasonable length of time. Shell oysters must be shipped in barrels and iced as a precaution against temperatures higher than that of water. A bushel of shell oysters will yield a gallon of flesh and liquor, and adding the cost of transporting and of the labor of opening to the price at the shore, one will see that from the viewpoint of the wholesale or retail dealer the opened oyster is to be preferred to the shell oyster.

The companies engaged in the oyster industry at Warren usually contract to supply stated quantities to customers. The oysters are opened fresh each day and are shipped in cans packed in tubs of ice, much the same as ice cream is transported, the tubs being closed with clamped covers to retain the cold air and minimize the meltage of ice. When sent out in wholesale quantities the cans are 10 gallons capacity and the fully iced tubs and filled cans weigh about 115 pounds each. When shipped in this manner oysters can be sent considerable distances. Being perishable, however, expedition in handling and transit is necessary,

and for years shipments were sent by express.

Shipping by Express.

The oyster season is from Sept. 1 to May 1, and during these eight months the consumption is very large, but the remainder of the year a comparatively small part of the ordinary yield is sold. Until the present season the oyster growers filled their orders and the tubs were taken from the "houses" by drivers of the Adams Express Company and shipped from Warren to the individual customers. Warren is served by the

electrified Providence, Warren and Bristol branch of the New Haven road, and from this point the shipments were distributed. The greater part of the tubs dispatched are taken by Boston customers, usually wholesalers, and these in turn distribute the oysters from their Boston stores. These tubs were sent to Providence and there transferred to express cars on the steam railroad, taken to Boston and there delivered to the customers.

This manner of shipping necessitated seven handlings, the collection and shipment at Warren, the unloading and reloading at Providence, and the unloading, loading and delivery at Boston. To insure forwarding by express the tubs had to be in readiness by 4 in the afternoon, and they were sent out with the regular shipments. For years the tubs were made ready by the growers and the express company notified, this ending the responsibility of the shippers. Each consignment was separate and if the shipments were ready any delay was up to the express company. The tubs were supposed to be delivered before or by 7 each morning, but anywhere from 7 until 12 was the actual time they were received, with 9 as perhaps a fair average. The Boston consignees demanded that the deliveries be made at 7 because the oysters were stock in trade that was necessary for the transaction of business, and delay in the morning meant retardation of local shipments and deliveries, dissatisfaction of customers and more or less loss to them.

The Adams Express Company received remonstrances, individual or concerted, from every man receiving Warren river oysters, until the dealers were absolutely discouraged. Unless the stock could be received on time business was decidedly uncertain, and the trade demands could not be denied. The express company was master of the situation and delivered the tubs on a go-as-you-please basis.

This was the condition last April just before the close of the season. The Warren growers were hopeless. They believed that their market was more or less affected by the uncertain service and prices necessarily influenced, but earlier shipment by them would

not bring about a change in delivery. Being informed of the facts Mr. Cotrone visited the Warren growers and got a list of their customers in Boston. Then he interviewed the Bostonians. He told these men that he had two trucks with capacity for carrying nine tons of freight, that he would bring the tubs of oysters over the road to them each night and would undertake to make delivery at any hour desired in the morning. There was some doubt expressed as to the dependability of the trucks when the long hauls were considered, but Mr. Cotrone maintained that if he couldn't do the work the contract need not continue, and the best insurance he could give until he had proven what was possible and practical, was his word, based on his experience with the machines. The Boston men were asked to pay the same price they were paying the express company, both for hauling the tubs to Boston and returning them when empty, the benefit they were to receive being delivery at 7 in the morning and being able to do business with their customers with certainty. So general was the dissatisfaction among them that all accepted the proposition, and arrangements were made for truck transportation when the season opened.

Mr. Cotrone lives and has a garage in Globe street, Providence, and he makes his headquarters there, this location being not far from the direct route from Warren to Boston. As the oyster fishing is somewhat dependent upon weather conditions, and the shipments must be fresh, the orders are not made up until late in the afternoon, and sometimes in the early evening. This necessitates waiting until the end of the day before the collection could be made, and so the trucks are sent to Warren from 3 to 4. The tubs are packed and placed on platforms at the oyster houses and are generally ready between 4:30 and 6:30. The five-ton truck has a short body and a standing top with removable side slats, these being covered with curtains. Into this 100 tubs can be packed in three tiers, but the four-ton truck has a stake platform body that will take two tiers of 40 tubs each, so that when fully loaded the machines have a normal capacity of 180 tubs, each containing 10 gallons of oysters.

How Shipments Are Made.

Because of the desire to sell all stock so there shall be none on hand Sunday, no opening is done Saturdays at the oyster houses other than to supply local demand, and the tub shipments are made the first five days of the week, there being practically no supply in the Boston market for Monday. The trucks are not operated in this work from Saturday noon until Monday afternoon. The necessity of systematizing the loading so that the tubs could

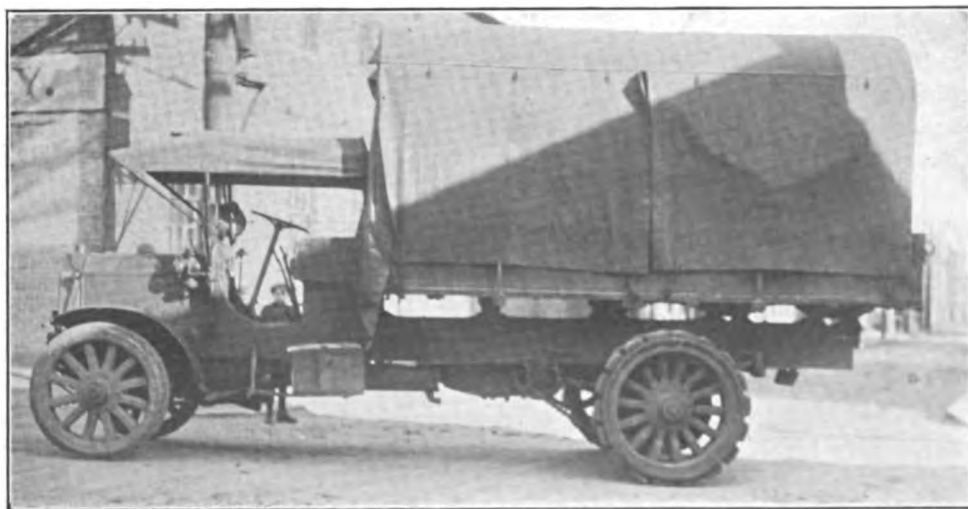
be delivered to the consignees with minimum handling was apparent, and after the route in Boston had been decided the loads were systematically collected. A few trips were made before the better route for delivery could be determined, but a majority of the Boston dealers are located in Atlantic avenue and most of the others in sections of the city that can be conveniently reached.

After loading the trucks are driven to Providence and to the garage, where they are kept until midnight, when the start is made for Boston. Five hours is slow time for the run, because when the truck is started it is kept moving, and with no obstructions and a comparatively clear road a uniform speed can be maintained. In constant driving over the road the drivers become very familiar with conditions that usually obtain. With normal weather the trucks are driven through in very close to a given time, arrival being governed somewhat by the time of departure.

When the first few trips were made the trucks were often at the stores before clerks were there to receive the shipments, for all tubs must be signed for, but after that the stores were in readiness and the machines were not compelled to wait or return. As the deliveries are made the empty tubs are collected and these will vary from day to day, as will the loads. The return is made over the same route and usually by 1, and sometimes by 12, the trucks are back at the garage in Providence.

Comparison with Express Service.

The loss of the business was not pleasing to the executives of the Adams Express Company, and after solicitation and other means had failed to induce the oyster dealers to abandon the truck service the company offered to get the tubs through at the time that it had formerly been expected to, and to return the tubs to Warren free of transportation charges. The dealers, however, realized the benefit of the overland freight line and the majority of them continued their patronage, although they are paying for the return of the tubs. With the trucks operated daily the express deliveries are now made very promptly at 7, in strik-



Five-Ton Peerless Truck That Makes Trips of 130 Miles Five Days a Week Between Warren, R. I., and Boston, and Has Been Driven More Than 21,000 Miles in a Year.

ing contrast with the delays of previous years. The dealers realize that with the motor service for their exclusive benefit and controlled by them they can have their own desires satisfied, and without it they would be no better off than they were before. For this reason they have not listened to the proposition of the express company.

The business is good for eight months of the year, and after that time it is doubtful whether there will be sufficient freight to justify the operation of the trucks, but this is a matter for future consideration. The trucks earn the regular express rates for one way, and the express charges for the return of the empty tubs, but the latter is a comparatively small amount when contrasted with the former. For this reason, from the viewpoint of the owner, the trucks are not as profitable as they could be were there full freights both ways. The long runs necessitate care to have the machines in good condition at all times, for the loss of a trip would be a serious matter. From three to four hours each afternoon and about the same time each night is available for repair or adjustment, and from Saturday afternoon until Monday afternoon for work that is of considerable consequence. Mr. Cotrone drives one of the machines himself, and another driver and three helpers make up his working force. The drivers go through with the machines each night, but the helpers alternate on the trips, for they assist in collecting the load.

The Truck Equipment.

The entire repair and care of the machines is directed by Mr. Cotrone, who is an expert machinist, and he says that he has had no occasion to take them to a repairer, for in the event of need he can avail himself of the use of the machine tools in the shop of a friend, and he has the experience that fits him for any work that may be necessary. He was working in a machine shop in 1912 and late in the summer bought an Alco truck and made a contract with a coal company to haul fuel. He sold this machine after using it about four months and purchased the five-ton Peerless truck. This he used in contract coal and in contract construction work haulage, and at the opening of the summer resorts on the east shore of Narragansett bay last season he bought the four-ton Peerless truck and equipped it with a passenger body. He used this for public service between Providence and Crescent Park until the contract for freighting the oysters was made.

Both trucks are fitted with six-inch forward tires and six-inch dual tires on the rear wheels, and with these the results are reasonably satisfactory, but the long daily runs cause the tire cost to accumulate rapidly. The tire expense of the smaller machine is, however, because of its equipment with larger tires than is generally used for its capacity, proportionately less than for the larger truck. Aside from the cost of fuel, as the five-ton truck is geared lower and will consume about five gallons more gasoline in a run of 130 miles than the four-ton, there is but little difference in the

operating expense of the two vehicles. The smaller truck is limited to 14.8 miles an hour at 975 revolutions a minute, and yet it is seldom driven to that speed. The five-ton machine is geared to 10.8 miles an hour with the same engine speed.

The machines are carefully driven and being worked under the supervision of the owner they are not abused. For about eight months the five-ton truck was driven an average of 50 miles a day, and with the Boston-Warren route work the mileage for the year is approximately 21,000. The four-ton truck was driven for about four months in passenger service an average of at least 100 miles daily, and this and the Boston-Warren route trips will give an aggregate of about 25,000 miles. The work done by the two machines is double what would be regarded as good mileage in average work for the period of use, and reliability has not lessened with service. The work has been well systematized, and the service may be said to be reduced to a very practical degree of productiveness. It will be continued until the end of the oyster season, and there is reason to believe that truck transportation will be preferred from now on by the oyster growers. The development of other freighting over the road has not been considered, but it will receive attention as soon as time can be given to it.

A meeting of the creditors of the Lansden Company, Newark, N. J., which concern is now in the hands of Henry L. Davison, trustee in bankruptcy, will be held in Newark, Jan. 21, at which time sealed bids for the property of the company, either as a whole or divided, will be considered. The valuation of the factory property, its equipment, material, etc., including an allowance of \$10,000 for drawings, blue prints and patterns, is \$125,724.70.

The completion of two six-story buildings, 170 by 198 feet and 70 by 128 feet respectively, has increased the plant of the International Harvester Company at Akron, O., devoted to the production of power wagons, about 100 per cent., and when worked to its normal capacity the factory will turn out 30 machines daily.

The use of four trailers with a three-ton KisselKar truck, making a train that will carry the average load of a railroad freight car, has been found by the Kansas City Transfer Company to be a very economical manner of haulage.

The capital stock of the Hartford Rubber Works Company has been increased from \$1,000,000 to \$2,000,000, which is offered in preferred cumulative six per cent. stock at par.

A. W. Frantz has been named general manager of the Cass Motor Truck Company, Port Huron, Mich., which has been reorganized and has resumed business.

COMPETING WITH RAILROAD HAULAGE.

First Overland Express in Rhode Island with "Tailboard" Delivery, Rounding Out Third Year of Service---Plans for Expansion and Increased Equipment.

THOSE who question the endurance of motor trucks and wagons will not take issue with the statement that a period of about three years of constant service is a sufficient test on which to base judgment, and for this reason the experience of the Providence and Woonsocket Motor Trucking Company, which operates a highway transportation line between Providence and Woonsocket, R. I., justifies an unusual attention from those interested in road haulage. Since March, 1911, the company has used one truck, and for more than two years has operated a second, and not only are the machines giving as good service now as when first received, but they have every promise of being useful for several years more.

The company was the first to operate a motor truck for regular overland express work in Rhode Island, and its No. 1 machine was the third sold by the maker in the state. The company was formed by James Potter and a partner for the purpose of competing with railroad and trolley freight and express companies, as well as several concerns using horses. Strangely enough, Mr. Potter had been engaged in railroad work for 25 years, and it was his knowledge of the limitations of the steam and trolley road facilities that prompted him to enter competition for the business.

From centre to centre Providence and Woonsocket are 16 miles apart, the latter being tucked away against the boundary line between Massachusetts and Rhode Island, and both the tracks of the New Haven road and the highway follow the Blackstone river north, the road climbing gradually until Cumberland Hill is reached, when it descends into a basin surrounded by hills in which the northern city is located. While the highway is smooth and well surfaced the grade ascends constantly going north, and from Woonsocket to Cumberland Hill going south there is a hard uphill haul for about three miles. These conditions are stated to make clear why overland haulage with horses means long and hard trips and comparatively light freights, especially in bad weather.

No Competition by Railroads.

Before the days of the railroads the Blackstone canal was built for freightage between the mills and villages that had been established at short intervals

in the valley, and after the operation of freight trains this was abandoned and the railway practically monopolized the traffic until the completion of the trolley lines. The acquisition of the electric roads by the New Haven system practically eliminated these from serious competition.

Woonsocket is a thriving and prosperous manufacturing city, most of its industries being textile mills, and the railroad has for years profited by the rates charged for the comparatively short haul, the freight service being exasperatingly slow and undependable. Woonsocket business men say without hesitancy that both commercial growth and industrial development have suffered because the railroad has not provided the facilities that would stimulate local prosperity, and a great deal of purchasing is done in Providence because the stores and shops cannot supply the immediate de-



Packard Three-Ton Truck, First Machine to Be Used in Overland Express Work in Rhode Island, Driven 45,000 Miles Since March, 1911.

mands of customers, largely from slow freights and infrequent express service. In other words, the railroad was absolutely indifferent to the people and from every point of view its service was a handicap instead of being promotive.

Mr. Potter had no experience with highway haulage of freight, but he had confidence in motor trucks and believed that the business men of Woonsocket would patronize his enterprise. He talked with a number who assured him that he could depend upon their support, and he found numerous Providence firms that were equally well disposed. While he was somewhat uncertain as to what service would meet the most success, he realized that a machine to meet his requirements and insure a reasonable return on the investment, should have considerable capacity. His deci-

sion was to purchase a three-ton Packard truck, and this was equipped with a standing roof, with removable side slats, so that freight could be loaded or unloaded at the sides as well as the rear.

Service Planned to Serve Many.

Mr. Potter's home is in Providence and he arranged a schedule so he could leave his last place of call in that city by 9 o'clock, going north through the Fairlawn section of Pawtucket, Saylesville, West Lonsdale, Berkeley, Ashton and Cumberland Hill, and returning to go through Cumberland Hill, Ashton, Berkeley, East Lonsdale, Valley Falls, Central Falls and Pawtucket, stopping en route to make deliveries or collect freight. He estimated his running time as two hours, and as he promised a delivery from the truck to the store or mill, this meant that considerable time would be required for making the calls for delivery and collection. By leaving Woonsocket at 2:30 or thereabouts he expected to make all calls returning and reach Providence by 5 or 5:30, this making possible deliveries before the close of business.

This was a tentative schedule, and it provided for one round trip daily, but the condition that appealed to the business men was the prospect of getting an early morning order shipped from Providence and delivered before noon, or of sending goods to Providence before the close of business there, or of making connection with the New York steamer lines. The Providence office was established with the Union Express Company, which is the headquarters of 13 overland express companies, and starting mornings at 6:30 or 7 o'clock, collections were made from different wholesale stores, leaving for the Woonsocket run at 8:30 or thereabouts. The two partners did all the work, both driving the truck, and Mr. Potter's railroad experience was a considerable asset, for he realized the value of a schedule time of arriving and leaving, this meaning much to business men who desire to convenience and accommodate their customers.

The rates established were between the railroad freight and the large express company prices, and considering the service these may be regarded as very moderate, for the quick delivery at either end or along the route could not be equalled from the average express route, while between terminals no distribution is made systematically by any concern. Regarded from the saving of time and the independence of the railroads the company is at least entitled to express rates, but as the start was made without a patron, and the investment was justified merely by the assurances given, the prices were necessarily made as low as possible.

Second Truck Necessary.

Mr. Potter's brother-in-law was his first partner, and after about nine months this man retired and was succeeded by another man, and later this man withdrew and Patrick Conway purchased the interest. Before the end of 1911 the second truck, also a three-ton Packard, was bought, for the business had at that time been developed to such an extent that it could not be

carried with the original machine. Since that time both have been operated, practically on the schedule stated, and as a rule the freights each way are capacity loads. With the two trucks the work is divided, each calling at regular customers and making collections and deliveries independent of the other, unless there is occasion for one taking freight that the other cannot.

Both cover the same route going north, but one machine returns over this and the other goes through East Lonsdale, Valley Falls, Central Falls and Pawtucket, this insuring full service to each customer south of East Lonsdale. Trips are made each business day of the year, and with nearly three years' experience storms or road conditions have practically no effect, the machines going through with little or no loss of time. The only time that trips have been lost were when the trucks were withdrawn for overhauling or large repair. Good time can be made on the highway under nearly all weather conditions, the running time averaging about an hour and 30 minutes. The machines are governed to 18 miles an hour, and are seldom driven to maximum speed.

The conditions with reference to delivery from the trucks to the stores, shops and factories are such that very little time is lost in unloading. With this particular service the only handicap is the fact that the customers are often widely scattered and delivery and collection at Woonsocket, for instance, will necessitate from five to 10 miles driving, while in Providence the average is very nearly the same. Generally the trucks may be driven directly to the places of delivery, and with the drivers and helpers handling them the freights are quickly discharged, there seldom being cause for delay. Uncertain addresses sometimes require inquiry, but information is generally obtainable from the shipper, and store and shop shipments rarely cause a loss of time.

Largest Shippers Waste Much Time.

Surprising as it may appear, however, those who are the largest shippers, and as a rule those who profit to the greatest degree by the use of the service, are responsible for the greatest delays. While they condemn the railroads and the express companies for failure to expedite shipments, and turn to overland freightage because of the demands of customers for quick deliveries, very frequently they cause the trucks to wait because packages are not ready when calls are made, and appear utterly oblivious to the fact that waiting costs the trucking company money. The loss in single instances is of consequence, and the aggregate for a day is considerable. This is a fault that can only be remedied by a definite understanding, yet the partners do not always feel that they are justified in taking issue with their patrons and for this reason have been tolerant of a loss that is of decided importance. In other words, they have not believed themselves sufficiently independent to take a stand that would compel the shippers to have the freight ready at a stated time, and the business has not as yet justified

more than the one collection daily at either end.

Were the shippers aware of their own responsibilities, or required to pay for waiting time, there is no question they would make such changes as would minimize the loss, and no doubt two hours a day could be saved. If this were devoted to profitable work the earning powers of the trucks would be materially increased. Driving their own machines and having the greatest interest in their business, the partners endeavor to make every minute productive, and there is reason to believe that were less interested drivers employed the idle time might be considerably increased.

Owners Care for Machines.

The trucks are kept in a barn at Mr. Potter's home that serves as a garage, and here the owners give the machines whatever care and attention is necessary. The ordinary adjustments and replenishments are made each night before the day's work is concluded, and a greater part of each Sunday is given over to thorough examinations and such repairs as require considerable time. If machine work is necessary this must be arranged for at a shop, but everything that can be done with hand tools is accomplished by the owners, the helpers giving such assistance as is desired. The trucks are well kept and are in excellent operating condition. No. 1 machine has been driven close to 45,000 miles, and No. 2 truck approximately 35,000 miles, and practically all of these distances loads have been carried. Efficiency has not been diminished with service and Mr. Potter maintains the trucks ought to be good for at least double the present mileage.

The business has been developed and the possibilities for expansion are believed to be such, that plans have been made to add a third truck the coming spring, and if this project is realized one machine will be kept at Woonsocket and will make its trips in reverse of the route as now operated. With this plan Woonsocket will have an early morning collection and a late afternoon delivery, and Providence will have a late morning delivery and early afternoon collection, provided that the present trucks are operated as they now are. This is, of course, tentative, and may be materially changed. It is proposed to have stations for the receipt and delivery of freight, and to arrange a system of transfer that ought to be productive of considerable patronage.

That hard work and long hours, careful service and close attention to the convenience and accommodation of customers, are necessary in developing a business of this character must be understood, and there is no rose-strewn path to affluence, even with motor trucks. But this concern is

recognized as affording a dependable service and has received this recognition in competition that has been fought out on a quality of service basis.

ANNUAL "EXIDE" DINNER.

The annual "Exide" dinner, which has been for the past six years one of the social features during the Chicago automobile show, being tendered by the Electric Storage Battery Company of Philadelphia, Penn., to electric vehicle manufacturers, their agents and distributors of the company, as planned for this season will take place the evening of Jan. 28 at the Mid Day Club in Chicago. The invitations will be sent out in a very few days. The event has always been notable for an excellent menu, some capital speaking and an entertainment of unusual interest, and it is the expectation of those in charge of the dinner that it will be even a greater success than those of previous years.

PALMER-MOORE EXHIBIT.

During the progress of the national pleasure car show at New York City January 3-10, the Palmer-Moore Company, Syracuse, N. Y., exhibited at Lexington avenue and 48th street three machines, these including an air-cooled chassis with planetary gearset, an air-cooled chassis with open express body and detachable top, and a water-cooled chassis with sliding type gearset and open express body. On the street the company demonstrated an air-cooled chassis with a four-post express body, and a water-cooled chassis with sliding type gearset and a four-post express body. The display attracted much attention.

A hydraulic device that is substituted for the conventional gearset in power transmission is being experimented with by the Waterbury, Conn., Tool Company in a five-ton White truck in the service of that concern. If found practical it will be produced commercially by the company in the near future.



No. 2 Packard Truck of the Providence and Woonsocket Motor Trucking Company, During the Delivery of a Motor at a Well Known Woonsocket Mill.

FREIGHTING IN CITY DELIVERY ZONE.

Experience with Motor Vehicles Replacing Animal Wagons in Suburban Express Service Shows, with Possibilities Not Yet Developed, a Satisfactory Economy.

FROM a financial viewpoint the possibilities of a general expressing business with highway vehicles within the daily delivery zone of numerous large stores, and where there are unusually good freight and express facilities by electric railroads, may not appear alluring, because of the character of competition and the necessarily limited patronage. There is no question, however, that the people demand service that is not always provided for by large corporations, and this statement can be applied to the business of Hathaway's Express, which is operated between Providence and Warren, R. I., serving the people of the towns of East Providence, Barrington, West Barrington and Warren.

These towns are located on the east side of Narragansett bay, the greater part of the people living comparatively close to the shore. There are numerous summer colonies, some of which are densely populated from May to October, and during that period of the year the population is constantly in a state of transition and may be said to be double what it is during the other months. Besides the shore settlements resorts attract very large numbers day and evening during June, July and August. The trade of these towns is regarded at all seasons of such importance that the department stores, large groceries, markets and other firms dealing in general household supplies, as well as the wholesale houses, make regular deliveries each day throughout the year, and some of the local stores are of considerable proportions.

The electrified Providence, Warren & Bristol division of the New Haven road, which extends to Fall River from Warren, as well as a trolley line from Providence to Bristol, afford unusually good freight and express facilities, and as a whole the section may

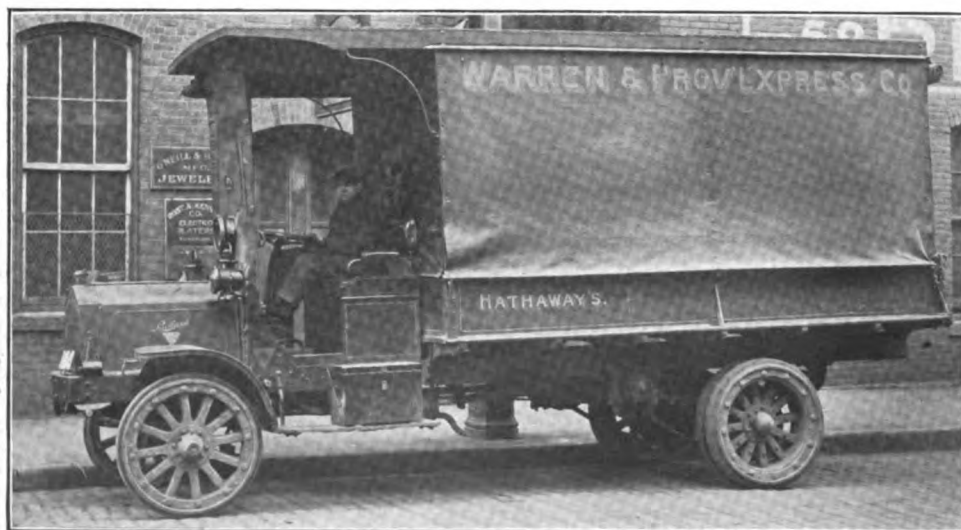
be said to be unusually well served so far as locality transportation is concerned. But it is evident that the transitory nature of the summer population demands more than the usual service, and the residents have been educated to exacting the warm weather conveniences throughout the year. The main highways through the towns are the equal of any in the state, and for reasonable distances capacity loads can be drawn by animals. From East Providence centre to Warren the villages are comparatively close, and detours are seldom necessary. The statement relative to the conditions is necessary that one may understand the unusually good facilities for freight and express handling and the exceptional delivery service of the large stores at the one hand, which would appear to minimize the volume of incidental haulage, and the reasons for the generally increased requirements of those who might be classified as temporary residents.

Business Well Established.

Hathaway's Express was established a number of years ago and for at least a decade has given a daily service between Warren and Providence. In that period it has become well known, and has developed a patronage that has continued throughout the year with the residents and from season to season with the summer colonists. It is not a large business, but it has been profitable for years and has been developed according to the demands of the people. Undoubtedly the competition of the electric roads and the express companies has limited its growth, and yet it has been the means of the public getting its transportation at moderate expense. But the large volume of business done by the Providence stores and shops that might have been handled with sufficiently low rates is carried by the transportation departments of these

concerns. In fact the regular delivery equipment used by Providence firms in these towns alone includes a number of motor wagons and trucks and animal vehicles.

The founder of the business sold it after he had developed it to practically the proportions it now has, and last March the present owner bought it. The equipment consisted of 10 horses and a half dozen wagons, but only one horse was bought, a Packard two-ton truck being purchased to take the place of the animals. This was an experiment in the sense that



Two-Ton Packard Truck Operated Between Providence and Warren, R. I., Making One Round Trip Daily.

the work was not what might be termed a long haul, and while the work was hard for horses, there was no question that they could be driven on the route for considerable periods with reasonable care.

One Delivery Each Day.

The Packard truck was placed in service and the work was planned to give one collection and delivery a day at either end, this following the custom that had been followed for years, and which appeared to give the greatest degree of satisfaction. At all of the stations along the route of the electric railroad save Warren, no delivery is made of express or freight, and this means that shipments are taken with the understanding that notification is to be given the consignees, this necessitating more or less delay as compared with the average service, while notices sent by mail were comparatively slow.

The truck has been used in a manner that has not realized its full productiveness, and yet it has replaced four two-horse teams. The demands of the business are unquestionably for a larger machine, when the loads are considered. The truck could easily make three round trips instead of one, and this would materially improve the service, but this has not been considered as yet. In one sense the past season was largely experimental and disassociation from horse methods has not been easy for the owner of the service or for the customers he serves.

Warren covers considerable area, and to reach the summer settlements that are served will require from five to eight miles driving daily, this being given over to combined collections and delivery, and this work is done with a horse and wagon instead of using the truck. Orders are received at the Warren terminal and from that point distribution is made. The morning collection is loaded on the truck and the driver of both the machine and the wagon start for Providence, making calls and collections until Riverside is reached, where the horse driver returns to Warren by train and the truck continues on to Providence, the driver collecting en route.

Converted Touring Car Used.

During the summer, when business is heaviest, the truck will reach Providence about 1 o'clock, but at mid-winter the time of arrival is perhaps an hour earlier. The intention was when the truck was purchased, to do all of the work with this, but when the service was greatest in demand calls at the northern end of East Providence could not be given the attention desired because of lack of time. Collections and deliveries had been made in Providence with a single



Converted Pierce-Arrow Machine Used for Collections and Delivery by Hathaway's Express Company.

horse and wagon, and as it was necessary at times to send this vehicle to East Providence, a motor equipment was decided on. A Pierce-Arrow touring car was purchased and converted to an express wagon by strengthening the chassis and installing an open body arranged with a hoop cover support at the rear.

The change of vehicles was decidedly beneficial, because it was possible to do all the work in Providence with the Pierce-Arrow wagon, as well as making deliveries and collections in East Providence, and when necessary it could be sent along with the truck on the Warren route. The usual time of departure from Providence is 4 in the afternoon at this season, and deliveries are made all the way, the arrival at Warren being from 7 to 8 o'clock, and the load remaining is distributed by the truck and the wagon, the larger packages being usually delivered by the machine.

The truck is driven by the owner's son, and the owner and a driver share the driving of the Pierce-Arrow wagon. None of the drivers is experienced with mechanical construction of machines and for this reason considerable outside attention is necessary, but this is done at the service stations of the makers of the vehicles. The truck and the wagon are not driven excessive mileage, 30 miles daily being a fair average, so it will be seen that both can be worked much more than they now are. During the summer, however, the truck will sometimes make two round trips, and the wagon will have a Warren run.

In winter the business is usually at its lowest ebb and the truck could be used for delivery and collection in Providence during the stay in the city, for the contracts with a number of stores for delivery necessitate a start later than might seem justified by other conditions. The circumstances under which the business was acquired and is now operated preclude a comparative statement relative to the economy of the machines, but the owner states that he is doing more work than when he assumed control and the business required 10

horses when he bought it. There is prospect of considerable development with the conclusion of winter, and it is not improbable that material changes will be made to enable the service to attract a larger patronage. The principal point is that the motor vehicles have opened the way for expansion, which would not have been practical with horses, and made a considerable gain despite very active competition from the stores and the public service corporations.

MAKING HIGHWAYS SAFE.

A bill is now pending in the Massachusetts legislature that was introduced by the Automobile Legal Association that is intended to establish the right of way of all vehicles using the highways, and to fix the responsibility for failure to observe the requirements of the regulation proposed. The bill provides that when persons travelling with carriages, wagons, carts, sleds, sleighs, bicycles, motor vehicles, motorcycles or other vehicles meet at the intersection of ways, where the traffic is not regulated by a policeman in uniform, those approaching from the right shall have right of way over those approaching from the left. All persons violating the requirements will be deemed prima facie negligent in any civil action against them for damage to property or injury to persons because of such negligence. Violation of the regulation is not a criminal offense, but in the event of civil action the burden of responsibility is placed upon those who fail to observe the provisions of the law. The bill has the indorsement of motoring organizations generally, and its passage will be strongly advocated.

DISTRIBUTE FILMS WITH TRUCKS.

The demand for moving picture attractions in the Metropolis and the desire of the theatres to give their patrons the latest productions has resulted in the formation of the Empire Service Corporation of New York City, which has purchased a 1000-pound GMC machine for the distribution of reels of film. That customers may have the same films the same afternoon or evening the reels are sent from one house to another and the machine is used for this work, being sent on a regular circuit. Thus the same reels may be seen successively at a number of theatres any afternoon or evening, a greater number being served than would be possible with any other manner of distribution.

BOSCH MAGNETO EFFICIENCY.

A Moline-Knight engine that was run for 336 hours continuously, the test ending Jan. 2, was equipped with a Bosch magneto and Bosch spark plugs, and in addition to the trial this equipment was used during preliminary tests, the horsepower and the five-hour economy trials without adjustment. During the 336-hour period of the demonstration 44,352,000 sparks

were generated by the magneto and 11,088,000 sparks passed across the gaps of the electrodes of the spark plugs, and the magneto contact breaker made 88,704,000 separate movements to produce the sparks. The result of the trial of the engine is regarded by the maker of the ignition equipment as proving the absolute efficiency of the system and its components.

SCIENTIFIC INDUSTRIAL HAULAGE.

The Edison Storage Battery Company, Orange, N. J., has published some exceedingly interesting literature relative to scientific management of industrial haulage, and naturally this has to do with the development of electrically operated facilities that may be substituted for steam, animal and manual power. One booklet is given over to internal transportation and the economies that are practical. The company emphasizes that it does not build trucks, tractors or locomotives, but places its data files, its engineers and experience at the service of managers who wish to minimize operating expenses, and similar assistance has been assured by the builders of equipment that may be utilized. Copies of this booklet, "Edison Storage Batteries for Industrial Trucks, Locomotives and Tractors", may be obtained by addressing the company.

REPAIRS FOR 14 MONTHS \$6.15.

A four-ton Peerless truck in the service of the Hartford, Conn., office of the Standard Oil Company, which was placed in commission in September, 1912, has been a remarkably economical machine. Though used six days a week for 15 months it was never withdrawn from work because of mechanical trouble or failure. Manager Freeman, who has supervision of the delivery, says that during the period named the entire repair bill for new parts was \$6.15, this including one fan belt, a short water hose connection and a half dozen grease cups. The truck has been driven more than 10,000 miles and is running very satisfactorily. The work accomplished with the machine was so pleasing that last June a three-ton Peerless chassis was bought and fitted with a tank for service from the Plainville station.

During the cessation of operations of the main plant of the Kissel Motor Car Company, Hartford, Wis., recently for the taking of the annual inventory and making repairs, a steam turbine with two 250 horsepower generators were added, this increasing the generating capacity from 1000 to 1500 horsepower.

Agitation has begun in Cleveland, O., for the enactment of a city ordinance that will require the use of fenders for motor service wagons, it being proposed to use the Detroit ordinance as a basis of the regulation to be submitted to the city council.

ONE TRUCK DOES WORK OF 25 HORSES.

Competition of Overland Freighting with Railroad and Express Company Between Providence, R. I., and Attleboro, Mass., Made Profitable by Use of Machine.

THE Peerless three-ton truck operated by Babcock's Attleboro & Providence express in public transportation between Attleboro, Mass., and Providence, R. I., is each day doing work for which 25 horses would be necessary. The truck is driven to a railroad-like schedule and the service has been so satisfactory to the business men of the town and city that the freight carried necessitates two regular and often three trips a day. The patronage has developed remarkably since the machine was placed in service, and while a comparatively small business the prospects are that it will continue to increase to much larger proportions.

Attleboro is 12.5 miles from Providence, and there are direct steam and electric railroad lines between the two, the running time for the former being 25 minutes and for the latter an hour. Attleboro has a population of about 18,000 and its principal industry is the manufacture of jewelry. Like many towns contiguous to Providence it has numerous small places of business, and the supplies for the factories and the shops and stores are generally purchased in Providence and Boston, and shipments must be made by railroad from either centre or hauled over the road. As Boston is 23.5 miles distant the steam and trolley freights and expresses are generally patronized, despite the fact that the rates are regarded as being very excessive. The shipments of jewelry, often valued at many thousands of dollars, are made daily by the express companies.

Railroad Rates Are High.

Though the Boston-Attleboro charges are large when the distance transported is considered, the rates for Attleboro-Providence shipments are even higher in comparison, and for this reason a considerable volume of freight is carried over the road. The Providence stores of first importance all make daily deliveries in Attleboro, and in a certain sense the town might be regarded as a suburb, but the stores of the town are representative and will compare with those of communities of similar size.

The main highway to Providence reaches the villages of Dodgeville and Hebronville, then passes through several sections of Pawtucket. The surfacing is excellent and the grades are comparatively slight. From

this aspect it would be difficult to find a route that was more promising for haulage, because of the possibilities for business between terminals and large loads that can be transported at what may be considered minimum expense.

The railroad and trolley passenger service, as well as the express facilities, are ample, the only reason for competition with this being the matter of rates, but the freight service is not only very slow, but the cost of handling at either end and the necessity of packing with the same care that would be desirable for shipment for 1000 miles, added to the high charges, is keenly felt by business men, who must fix their retail prices so that they can compete with the shops and stores of Providence. From every viewpoint the cost of stock and material must be kept at minimum, and while express shipments are at rates that include col-



The Three-Ton Peerless Truck Used for Overland Express Service Between Providence and Attleboro, Ready for a Load at the Providence Terminal.

lection and delivery the charges are such that freight is preferred where time is not a factor of importance.

Hard Work for Horses.

The conditions have impelled the patronage of men engaged in freight haulage over the highway, and for many years such businesses have existed, but while the distance is relatively short for railroad transportation the round trip requires hard work for men and animals. The experience has been with horses that there are few instances where the requirements are as severe. For instance, making a round trip would mean 25 or 26 miles without considering calls off the main route, and animals could not be driven this, hauling a load, oftener than alternate days, requiring two sets of animals, and an average freight of 3000 pounds would be as much as could be expected of a pair of horses.

Working horses the start must be made early in the morning and the return trip is not finished until late in the evening, and this means that the business men patronizing horse expresses must generally allow from 18 to 30 hours between giving an order in Providence and its receipt in their stores or shops.

These conditions were long endured by Attleboro men, and they were very willing to support any practical competition with the railroads and express companies, but the amount of money required to operate a successful service and the limitations of animals militated against those who engaged in this work. The express companies that engaged in this work were limited as to business because of the inability to compete with the railroads with reference to time, while the men owning them did not realize what they believed to be fair compensation for their work.

Saving with Motor Truck.

This was the condition when the service was owned by Edward Perry, who operated it for years, and it was considered to be the best of its kind. Mr. Perry purchased a Gramm two-ton truck about two years ago and with this began to improve the time of delivery and collection. With the truck the operating time could be greatly reduced, and the business men were able to get deliveries the same day as ordered. This was so decidedly an improvement that the truck was worked to its capacity, and the horse wagons were used for freight that was not as greatly needed, custom in a short time establishing practically two classifications of shipments. Shortly after purchasing the truck Mr. Perry died and the business was acquired by the present owner, who had been engaged in team haulage work nearly 40 years before.

Mr. Babcock had had long experience with horses and when he took the business he had ample opportunity to study the relative values of the animal and the motor vehicles. He had investigated the possibilities for development, and he did not hesitate to make such changes as common sense dictated. After working the truck and the horses side by side, over the same roads and doing practically the same work, he realized that the largest opportunity was in giving the business men along the route a service that would be faster than any other and at rates that would impel patronage.

He was not willing to accept theory and he depended upon the experience he could obtain from operating. He found that the business men were willing to give him all the freight that he could handle with his facilities. A tailboard delivery was tried out with the truck and when necessity demanded a single-horse wagon was used in Attleboro for collection and distribution, the truck and the horse teams being used for direct haulage. With the increase of business two trips were made with the truck, and to economize the time a single-horse wagon was placed in Providence to collect and deliver.

Mr. Babcock proved by experience the greater economy of the truck and believed that he would be

justified by eliminating the horses, and to do this a larger vehicle was necessary. In March, 1913, a Peerless three-ton truck was delivered to him and he disposed of the Gramm machine and the horses, and retained wagons that could be used with single horses at Providence and Attleboro. The new truck was a standard type with a large covered body that would carry large bulk, and with this a schedule was arranged that would best serve the business men.

The Daily Schedule.

Attleboro was the starting terminal and departure on the first trip was fixed at 7 in the morning, this permitting calls wherever necessary along the route and to take on freight that could not be handled from the horse wagon. All of the packages collected during the late afternoon and evening were loaded the night before and the chassis frame jacked to relieve the springs and tires from excess weight during the night. The in-bound route was made through South Attleboro, the Pleasant View section of Pawtucket, and from Main street square in that city to Providence the same as returning, but the return was made through the Darlington and Lebanon sections of Pawtucket, Hebronville and Dodgeville, covering a loop and serving all sections. The arrival at the Providence terminal was at 9, and with four men the freight was quickly removed and a fresh load put on, so that but 15 or 20 minutes was required to start the machine unless a delivery of heavy freight necessitated a separate call.

The outward trip required about two hours, stops being made for delivery en route, but on arrival at the Attleboro terminal the freight was removed and with the undelivered South Attleboro and a fresh load, which had been collected during the morning, the second trip was begun by 1:30. Four men handled the freight at this end and no time was lost, and the truck, as in the morning, had a crew of three, unless it was necessary to keep a second man in Attleboro to assist in the delivery. At South Attleboro delivery was made and freight taken on, and by 4 the Providence terminal was reached for the second time. The same routine was followed and by 4:15 the machine was ready for the return, and with the ordinary freightage the Attleboro terminal had delivery of the load from 6:30 to 7.

This description is of a day when two trips are made, but with a third trip the start is earlier and time economized wherever possible, so that the departures from Providence are at 9, 1:30 and 6:30, or thereabouts, and the Attleboro terminal is reached about 9, but the third load is only partly delivered at Providence, and is not distributed until the following morning at Attleboro, unless in the event of special need. In the event of the third load care is taken to make delivery of everything that is urgently required on the second trip, so as to insure delivery. With two trips, practically every package is delivered the same day as shipped, though South Attleboro freight from Providence is generally held over night in Attleboro.

Results That Are Obtained.

The Attleboro man who delivers an order in Providence by mail or telephone can receive the goods practically at noon if the package is sent to the Providence terminal or notice given for its collection up to 9 in the morning. Or he can supply a customer early in the evening from an order given as late as 3:45 in the afternoon. Shipments can be made to Providence with equally good service, and so the overland express is carrying practically capacity loads the entire mileage driven, which ranges from 50 to 75 a day. Three trips are made about half the time, although Saturdays only one is the rule, because of the early closing of the shops and factories. The average weekly mileage will approximate 300 miles, and frequently 325, and the tonnage will reach, if not exceed, three tons to the trip.

Mr. Babcock pays excellent wages and expects his men to earn them. The driver had more than six years' experience with automobile vehicles before he started to drive the Peerless truck, and of that time three years was in repair and garage work, so he does practically all that is required to keep the machine in high class condition. When necessary he works nights, and every Saturday afternoon the truck is gone over carefully and adjustments made, so that it is always kept in excellent condition. He is expected to keep the machine operative, and thus far not a trip has been missed. Not only this, he drives with extreme care, and this means a great deal so far as wear is concerned.

Speaking of the work done by the truck, Mr. Babcock says that when used for two trips a day it is doing the work that would require 25 horses, and with animals the start would be at 5 and the finish for the day at 10 at night, and when three trips are made the truck saves at least three hours of the time that would be necessary with but a single trip for animals. So far as the business men are concerned they have service that is faster than the average expressage, and the prices charged are lower. The business has increased constantly, and it has reached such proportions that another truck will be added in the spring to take care of freight from sources that have not as yet been developed, but which have promise of yielding a tonnage that will equal that now carried.

WHAT IS A COMMERCIAL VEHICLE?

The commercial vehicle committee of the National Automobile Chamber of Commerce has adopted the following definition of the term "commercial vehicle":

A commercial motor vehicle is a self-propelled vehicle designed to be operated without rails for the primary purpose of transporting materials, products, passengers or apparatus especially for business purposes or for hire, profit, emergency work, or special utility service as distinguished from private personal use by the owner or renter for enjoyment or convenience.

The reason for this differentiation was the decision of manufacturers to restrict the annual exhibitions at New York and Chicago to passenger vehicles, this necessitating a definite determination as to what vehi-

cles could and could not be displayed. As defined by the committee all machines are excluded that are not primarily designed by the manufacturer for industrial or commercial purposes, so that a taxicab station wagon or stage, used for private passenger conveyance by the owner, is classified by the purpose of the builder. Fire apparatus is included in this class, but fire chiefs' cars, being pleasure car chassis fitted with special bodies and used for special purposes, are rated with the passenger car class. Converted pleasure cars are rated as passenger vehicles, although officially registered in the other class. It will be understood that the decision, while primarily adopted to benefit the show committee, will be undoubtedly accepted for the classification of all motor vehicles of American production.

TRUCK EARNS COST IN 10 MONTHS.

The cost of a White truck in the service of the sanitary department of Atlanta, Ga., was earned by the machine in 10 months, during which time it was driven an average of 30 miles daily, making a total mileage of 7800, carrying 18.4 tons daily and a total tonnage of 4784. The truck is used for transporting refuse from the business section of the city to an incinerating plant and does work for which 12 mules, 12 single carts and 12 drivers were necessary. The operating and maintenance cost of the animal equipment was about \$600 a month, and the average expense for operating the truck was less than \$200 a month, including the cost of a helper, whose pay was figured in the operative expense of the mule carts. The economy of the machine was so great that the department has purchased two more trucks.

BRACKETT SUCCEEDS MORRIS.

M. E. Brackett is now manager of the New England branch of the General Motors Truck Company, succeeding J. L. Morris, resigned, and in charge of the business at the headquarters of the company at Boston. Mr. Brackett was travelling representative for the general manager and sales manager of the company before his appointment, and in that capacity visited all parts of the country. He has been connected with the industry for eight years and has intimate knowledge of every detail of the business from production to selling. Mr. Brackett proposes to inaugurate a vigorous selling campaign in New England for the GMC gasoline and electric service wagons and trucks.

The Wagenhals Motor Car Company, Detroit, has appointed L. B. Sanders manager of its sales department.

The tentative dates for the mid-summer meeting of the Society of Automobile Engineers are June 22-27, and the place will be Cape May, N. J.

ELECTRIC DELIVERY SERVICE.

Company Formed at Cleveland, O., to Distribute the Sales of Many Stores.

Beginning with 25 Baker electric wagons ranging from 1000 to 8000 pounds capacity, and three gasoline trucks, the Delivery Company has inaugurated a service at Cleveland, O., which is expected to be developed to large proportions. The company was organized by Cleveland men who purpose to afford to the merchants of that city facilities for distribution that are superior to what had previously obtained, and which will insure a large measure of efficiency at prices that are more economical than could be realized from separately operated equipment.

The company expects to add to its vehicles as needs are developed, and if the service is increased as the promoters of the company believe it will be, there will be 75 electrics in use before the end of the present year. The company makes contract to furnish vehicles of any desired capacity and any type body, bearing the names of the firms using them, for a stated cost, but where the machines are specially equipped and ornamented for a business house, contract is for a year, the price including the wages of the driver and every expense, and varying with the size. About half of the vehicles are rented in this manner. The remainder of the wagons are used for the delivery of merchandise and packages of all kinds, the charge being based on the size of the unit and the distance to be carried.

Thus for a contract price the firm may have a vehicle of any class constantly at its command, or it may have the work done on the unit basis and pay for this work at stated intervals. The company has already made contract with about 175 business houses and this number will, no doubt, be increased as rapidly as the service is demonstrated. The company began business in November and during that month the machines were driven an average of 41 miles daily and delivered an average of 181 packages. During December these

averages of number and mileage were considerably increased.

The company is now building a station that will include its offices, receiving and shipping departments and garage in East 21st street, which ought to be ready for occupancy Feb. 1, and meantime it is using a rented store for receiving and shipping and the machines are housed in a convenient garage. The station will be 100 by 140 feet and will have garaging facilities for 75 vehicles, and it will have equipment intended to afford the greatest economy of time and labor in every department.

The sales from the different stores that have the contract delivery by package or unit are collected and taken to the receiving station, where they are sorted for routes and then arranged in the wagons for distribution. The necessity of minimizing every work in connection with the delivery is evident. With the garage the purpose is to have sufficient storage space for all the machines that shall be used, with facilities for giving such care and attention as may be necessary, but because practically all of the wagons are electric and the factory of the builder is in Cleveland, shop and tool equipments are much smaller than might otherwise be needed. The gasoline trucks are used for long distance hauls to suburban points and reasonable provision is made for caring for these, but the company does not expect to add to this number unless the service is considerably extended.

The company is well financed and equipped, and the system for distribution has been carefully developed. It is prepared to undertake any work and to guarantee that the service will be uniformly good and that all patrons will be equally well served.

A tractor designed for use with trailers in general highway transportation is to be built by the Detroit Wagon Works, Detroit, and will shortly be produced commercially.

The 1914 session of the American Road Congress will take place at Atlanta, Ga., the week of Oct. 19-26.



The Vehicle Equipment of the Delivery Company, Cleveland, O., Consisting of 25 Baker Electric Machines and Three Gasoline Trucks, Used for Merchandise Distribution for Stores of That City.

LONG DISTANCE ROAD HAULAGE.

Possibilities for the Development of Freight Transportation by Highway Vehicles Between Commercial Centres in Competition with Railroad Lines.

THE productiveness of transportation equipment depends entirely upon the loads carried. If the freight is the same during the haul and is to the capacity of the vehicle the other factors to be considered are speed, haulage conditions, loading and unloading facilities, and administration, which may be said to include operation, care and maintenance. Turning to production, with the average service, the load may be safely assumed to be carried practically 45 per cent. of the distance traversed, the remainder being empty or "dead" haulage. This means that the earning power of such equipment is limited to 45 per cent. of the possibilities were a full load carried. The greater the percentage of loaded haulage the less the cost, no matter what unit of measurement may be used.

Usually the result is expressed in weight or number of packages of standard size.

No one will question the fact that with horses the maximum mileage possible is from 15 to 20 daily, and accepting 10 hours as the working time of a day this will permit movement at a speed of from three to four hours half the time, and the other half is of necessity idle time, which can be given over to loading or unloading without encroaching upon the working period. The animal is limited in speed and physical capacity. The conditions of use are such that under the most favorable circumstances it is impossible to consider them for any distance beyond 10 miles for regular haulage, although this may be considerably increased for occasional service or where the work is a straight haul in one direction.

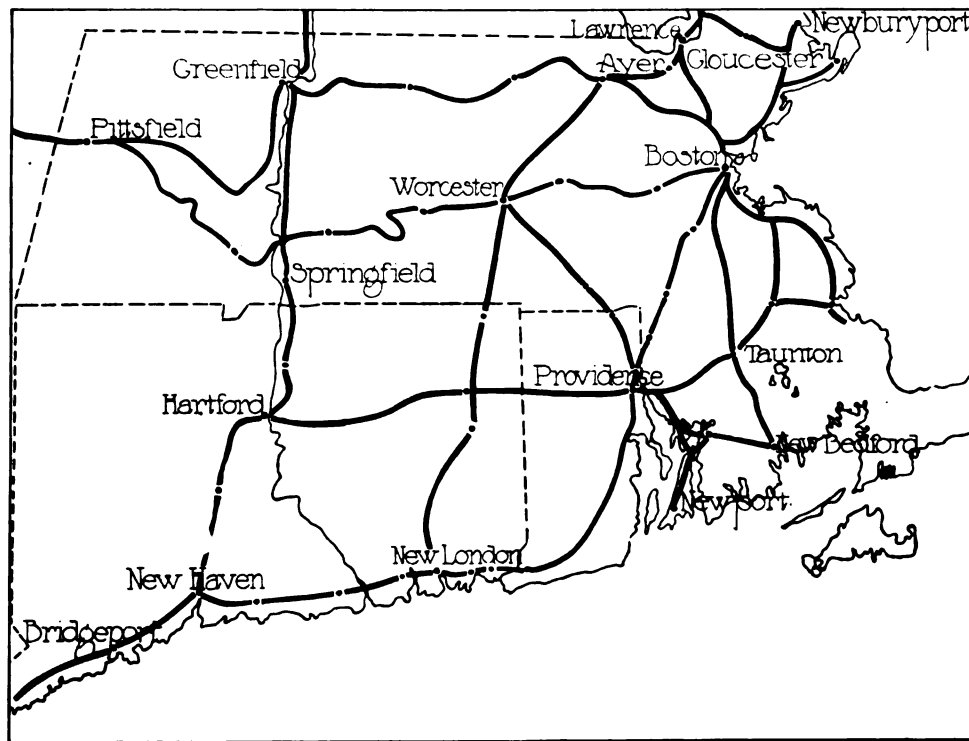
Long Hauls Most Economical.

The long haul is always the most economical, no matter what the form of transportation, and this ap-

plies to road vehicles quite as well as to railroads or vessels. There is, however, greater probability of return freight with the transports of common carrying enterprises, and the development of these depends very largely upon the service that can be afforded in either direction. Where a transportation department is maintained by an industrial or commercial concern, it is not often available for others, and usually it is not largely in excess of normal requirements. The policy generally is to have what equipment will be sufficient for ordinary purposes, for this can be at times worked beyond capacity when necessity arises.

The economy of any form of transportation is dependent upon two factors, the one being time and the other the lowest expense. Where time is not mate-

rial and freight can be delayed to practically any extent without affecting business, then it may be carried at convenience and in such manner as will be at minimum of expense. But where time is valuable and business transactions are dependent upon expedition, then speed is required proportionate to the need. The



Map of New England Showing the Main Highway Connections Between Commercial Centres That Could Be Terminals for Motor Truck Haulage, with Established Service to Points Beyond the Regular Routes.

point of demarcation where economy of time and economy of cost are equal in value to the business man must necessarily vary with each individual transaction, and so it is impossible to establish either as a constant. This being so, the determination of the individual must be accepted.

With every transportation proposition so many variables must be considered that rules can hardly be applied, and while principles may be followed generally results are very largely governed by proportions, the administration of the large concerns usually being the better and consequently the more efficient.

Considering motor vehicle haulage, there are those

who believe that machines are not economical for work within a radius of five miles or less, and that the fullest value is not realized until the average haul is at least that distance. But while there may be question as to the exact point in distance where in productiveness the motor wagon is superior to the animal conveyance, there is no doubt that beyond that point every factor contributes to the advantage of the former, and this increases to another point where the railroad or water lines become in turn more economical than the motor wagon. It is obvious that with any form of transportation the cost decreases with the increase of capacity.

What has been stated with relation to doubt as to the economy of the motor wagon or truck is applied to what may be regarded as the short hauls, but where haulage may be systematized between two points it is entirely practical for freight to be carried for considerable distances, as far as 50 miles, and distributed with saving as compared with either freight or express service. It is certain enough that if the haulage can be in either direction between points the productiveness may cover the entire distance, or a very large percentage of the capacity may be carried for every mile travelled while in regular use. That is to say, that a start may be made from one terminal with a load and this lessened by deliveries along the route to the other terminal, and the return made with similar distribution. This may give an average of from 50 to 75 per cent. of the route, which is largely in excess of the average productiveness of the machine that is productive less than half the mileage traversed.

The volume of industrial and commercial products transported by highway is comparatively small, and in sections where the business centres are short distances apart, as in New England and the eastern states especially, the conditions are unusually favorable for the establishment of motor vehicle service which will have all of the advantages of long and constantly productive hauls. There are many reasons why such means of transportation should be profitable.

Railroad and Trolley Service.

Considering the railroads for a moment: First the rates for freight carrying have for years steadily increased and, with the greater operating cost, the companies have been compelled to exact what may be regarded as excessive charges. Despite the increase of rates the service has not improved and there is less efficiency than when competition impelled expedition in handling and minimum charges. Those who have expert knowledge of railroad transportation say without hesitancy that the cost will never be less save through some remarkable change that cannot be anticipated, and which will probably not long endure. In fact this condition may be applied to all forms of transportation, and with labor unions forcing increased wages and capital demanding reasonable return on investment the probabilities are that the railroads will bring about the establishment of rates materially larger.

The trolley lines have been established mainly for

the transportation of passengers and the haulage of freight is incidental. Some of the companies, where it is possible to make satisfactory traffic arrangements, have inaugurated service which will reach sections more or less limited, and these have differing classifications, one where the goods are delivered at one terminal and on arrival at another the consignee is notified to call at convenience; the second where the goods are collected by the company and carried, and similar notification given, and the third where the goods are collected, transported and delivered, the three affording what may be termed fast freight, limited express and full express. Service of this character is not general throughout the country, and where express service is specialized this means the maintenance of highway vehicles for collection and delivery.

Besides this there are the express services of the large and the small companies, some being identified with railroads, others carrying goods on railroads, while many afford transportation between different places by vehicle. There are hundreds of commercial centres that are from 25 to 50 miles apart, and with towns, cities and villages between them on direct lines of highway communication, so that with two terminals it would be possible for service to be given in either direction at such intervals as would be justified by patronage.

Highway Transportation Possibilities.

If the possibilities of highway transportation are to be realized it will be necessary for those engaging in it to develop such affiliations as will be productive, and this means that it would be practical for transfer of goods to be made from the one company to another under a traffic agreement that would be mutually satisfactory. Mileage might be the measure on which the inter-company business could be handled. There are many suggestions that might be developed and adapted, the one object being to divide the revenue so that each would be equitably compensated for the service. Exchange of business is common enough with express companies, but the idea as stated is merely to illustrate the possibilities that might be developed by unity and a section of considerable size served with economy to the public and profit to the concerns engaging in it. That is to say, that instead of each being an independent service an exchange would bring about a relation that would be profitable and would be shared by all. Such an exchange could be furthered by a central receiving station, which would virtually be a clearing house for all companies, and this could be maintained at small expense by a number, each contributing, proportionately or on any basis that might be equitable.

Companies operating on main routes might in turn have affiliations with those serving smaller communities, and it would be practical for all services having routes of considerable length to utilize motor equipment. There are hundreds of small services that could in this manner be developed, and with the rates the same as those of the railroads or the other companies

There is no question of patronage, from the fact that deliveries and collections could be made, this being a factor of considerable importance. From the viewpoint of the practical business man there would be many reasons why such service would receive favor. From each commercial centre routes could be established that would serve varying sections, and with many available merchants and shopkeepers, particularly those who purchase in small volume, but frequently, could be able to have stock sent in whatever quantity at any time desired.

Opportunity for Patronage.

As a matter of fact large population is not the only factor to justify the establishment of motor vehicle transportation service. Undoubtedly the patronage would be larger in communities of considerable size, but the possibilities of developing contract haulage with manufacturing firms, stores, etc., ought to be exceedingly attractive. Such business could be established on a very dependable basis, for traffic of that character would be constant, and without question a considerable volume of haulage could also be secured. Indeed, of course, that there was assurance of satisfactory service.

Considering any of the present forms of transportation there is reason to believe that the charges will continue to increase. The parcel post is limited to packages of 20 pounds or less, and with long hauls and increased productive mileage the motor vehicle transportation company with reasonable administration can easily be operated so as to be profitable. By that is meant that the motor truck can today be used for those places where its economy is known, and that there are thousands of conditions where it will not only be efficient, but it will be possible to develop business through the lower rates that can be made for haulage. The East has seemingly better opportunities for highway transportation than the West, for the commercial centres are more numerous, the topography of the country is more favorable for highway haulage, the roads are generally more improved. Many of the state systems of roads have been developed to considerable proportions, and as the main thoroughfares connecting the cities are always given attention and are better maintained, the conditions for development of road transportation are constantly becoming more promising.

Deciding Upon Rates.

While it is true that the weight of freights that can be carried on road vehicles is limited to capacity, this limitation obtains with reference to any other form of conveyance utilized, and the rates are based on the cost of operation. Long daily mileage means, naturally, that the operating expense will be relatively high when with shorter routes, but if the service means collection and delivery, thus reducing or eliminating the need of the customers maintaining vehicular equipment, the rates can be based on something more than those charged by railroads or water lines.

To illustrate: The railroad could haul five tons 40

miles at a very low rate if the contract were for large tonnage, but it would necessarily charge a lower rate if the haul were longer. Motor vehicle haulage would be usually of small packages, or those which would be small for railroad or water transportation, for which an entirely different classification is made, and the rates for these, including collection and delivery, could be based on the economy that the customer would realize. Usually railroads connect the commercial centres, and while there would be no possibility of motor trucks competing with them in the haulage of large tonnage, a large volume of the packages sent and received could be carried.

The distribution at the terminals of each service could be whatever afforded the greatest satisfaction and was the least expensive. Were the exchange or transfer system the vogue this would afford transportation to points beyond, while local delivery could be done by the same organization or by others. In cities of considerable size the deliveries from business houses to customers in suburban points is constantly increasing, and as the majority of firms seldom serve their patrons at a greater distance than 10 miles, other means of conveyance are utilized, these being either freight, express or parcel post, that being chosen which is least expensive, or which will meet requirements when the demand of the customer is known. Where time is limited the cost is greater. Such service as can be provided with motor vehicles ought to attract a considerable volume of such patronage.

MOORE MOTOR TRUCK COMPANY.

The Moore Motor Truck Company, organized at Philadelphia, Penn., has located at Wilmington, Del., where a building at Buttonwood and C streets has been leased with a guarantee of purchase within six months. The installation of machinery has been completed and the company is now ready for production. A wing 200 by 60 feet will be added to the plant. The company will employ about 75 men at the start and expects to build about 350 machines the first year. The machine will be built in one size, having 3000 pounds capacity, and is said to be a highly perfected type of vehicle.

The officers of the company are: President, Thomas E. Moore, formerly vice president and general manager of the Bowling Green Motor Car Company, Bowling Green, O.; vice president, Samuel L. Dillon, Wilmington; treasurer, Frank B. Adams, Pittsburg, Penn.; secretary and assistant treasurer, George W. Brewer, Philadelphia; sales manager, C. L. Dambley, Philadelphia.

A new factory, 100 by 500 feet, is now occupied by the F. L. Moore Truck Company, Torrance, Cal., and about 125 men are now employed. The plant, when operated to its capacity, can turn out approximately 1000 machines annually.

MOTOR TRUCK SAVES HALF OF HORSE COST.

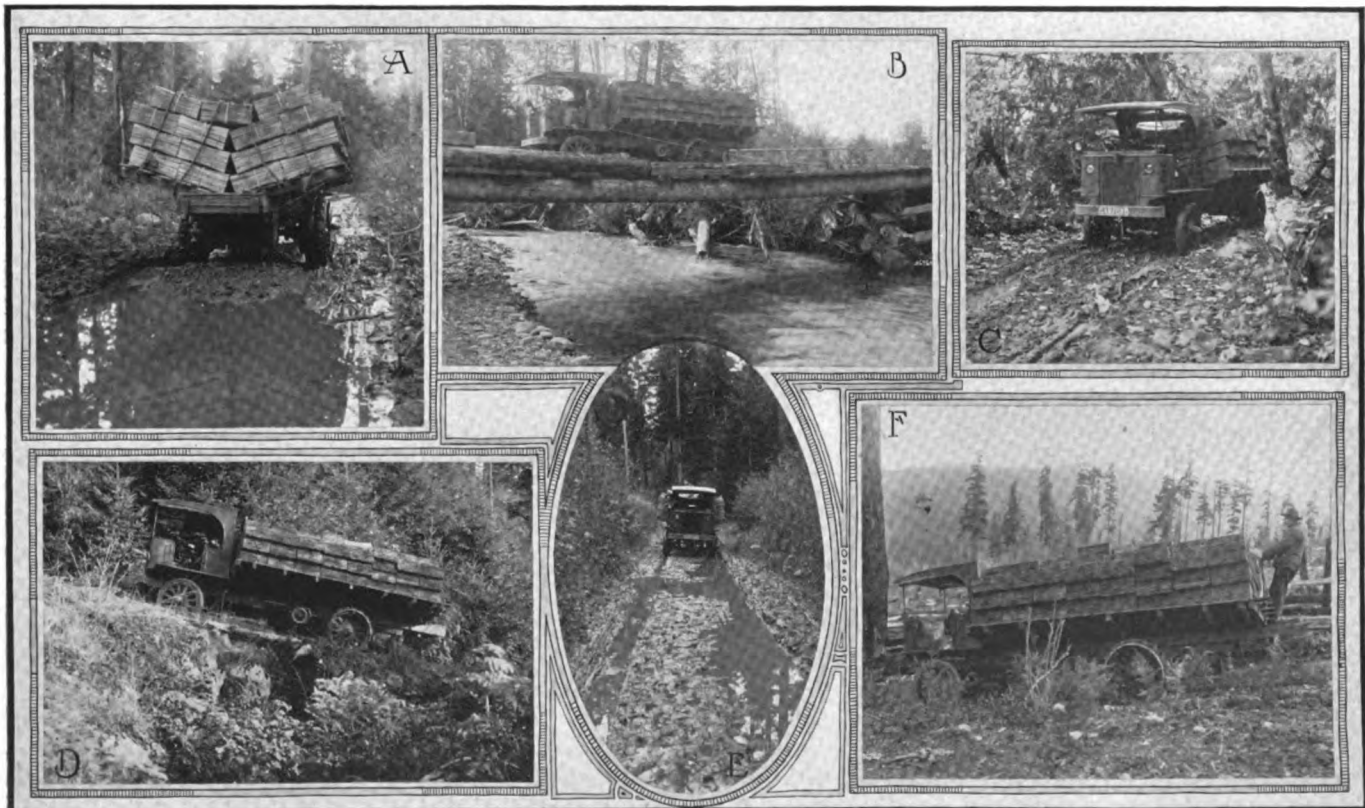
THERE are those who believe that the motor service vehicle is best utilized over roads that are smooth and level, where the loads can be handled quickly, and where the hauls can be made with comparative speed, for these conditions would appear to be most favorable, and yet where the requirements are directly opposed to those stated, remarkable efficiency has been realized. One factor will always govern the real productiveness of a transport, and that is the value of the load carried, for on this depends the earning capacity of the unit, whatever it may be. For this reason, where the freight has small valuation, the rate that can be charged for it, necessarily proportionate, minimizes earning capacity.

Trucks have not been generally utilized in lumbering because of the great difficulty of getting to and from the logging camps, and as logs are floated down rivers and streams wherever practical the mills are located close to railroads when possible. In some instances, however, owners of timber land have erected mills close to the camps and haul the manufactured lumber to the most convenient shipping terminal. Not many years since the largest timber cutting operations were in the eastern states, but each year the supply of standing wood has diminished and now the Northwest is being heavily drawn upon. On the Pacific Coast the lumber cutters have cleared vast areas and very frequently they have found the greatest economy in establishing mills and hauling the manufactured lumber

to shipping points. With each year's cutting the distances increase, and, of course, there is a limit as to what can be done with animals. This condition is very certain to result in the utilization of motor trucks and tractors, or the building of industrial railroads, and of these the former appears to be the most satisfactory, despite the labor of building roads.

Logging roads, however, mean mere paths from which the rocks and stumps have been cleared and bridges built where streams and ravines are to be crossed. Filling is merely bringing the surface to height that can be traversed, and during the thawing periods of the spring corduroy is regarded as sufficient to insure the trails being passable. Road making in forest, where the soil is largely deposits of decayed vegetation, where removal of stumps and rock entail filling, and where drainage cannot be promoted, is indeed difficult. Grading, to secure level and even surfacing, is often impossible.

Naturally, the operation of any vehicle over logging roads is slow and more or less dangerous because of the paths following the natural contour of the ground, and winding like a snake track to clear the largest obstacles. The difficulty of obtaining traction in climbing and of braking when descending grades is always to be considered, and in wet weather a road of this character will be churned into deep ruts and mud holes that generally mean smaller loads and more time for haulage, and sometimes becomes almost impassable.



Hauling Shingles in the Mountains of the Northwest: A, Typical Mudhole in the Trail; B, Crossing a Stream on a Log Bridge; C, Where the Going Is Good; D, Passing a Ravine in the Steep Grade; E, Level and Straight, but—; F, Where the Road Is Even Lacking.

A condition that can be better realized from the accompanying illustrations than from description, obtains in the use of the two-ton Garford truck owned by the Drury & Brown Shingle Company, which operates a shingle mill high on the side of a mountain 18 miles from the village of Sequim, Wash., which is the nearest point of railroad shipment. The timber suitable for manufacturing would necessarily be hauled were the mill located in the village, and this would mean the expense of transporting that wasted in milling, which would add materially to the cost, and so the best solution appeared to be hauling the bundles ready for shipment rather than the logs.

To ship the shingles a road was constructed that, despite the need of economy, was very costly. Some of the grades are 20 per cent. and for two-thirds of the distance the path is extremely rough. Several log bridges cross streams and brooks, and these are usually a few long logs with a corduroy of timber spiked to them. There are several sections of sand, a great deal of loam, a long succession of mud holes, and in one place the road is in a sandy bed of what was once a mountain stream. The road gradually ascends nearly to the line of perpetual snow, so that there is practically a constant climb when the machine is going to the mill, and a general descent when taking out the loads.

The shipping weight of a bundle of shingles is approximately 50 pounds, and loads such as are shown in the illustrations range from 100 to 120 bundles, so that 6000 pounds, or slightly in excess of that figure, will probably be a fair average of a freight. The truck makes two round trips each day, covering a distance of about 72 miles, and the cost of haulage has been reduced more than 50 per cent. as compared with horse work. The machine has now been in service for eight months and has not missed a trip.

The Sternberg Motor Truck Company of New York is now established in a new service station at 12th avenue and 123rd street. The lower floor is used for garaging and the upper floor for service purposes. The station will store about 125 machines.

The factory of the Firestone Tire & Rubber Company, Akron, O., is being increased 40 per cent. in capacity by the construction of two wings to the main structure. These are of reinforced concrete and will be ready for operating early in the spring.

A new factory for the plant of the Timken-Detroit Axle Company, Detroit, Mich., is projected and will probably be erected in the spring.

A building 30 by 90 feet, one story, will shortly be added to the plant of the D'Arcy Spring Company, Kalamazoo, Mich.

During 1913 approximately 13,000 motor wagons and trucks were registered in New York State.

WHERE TRUCK IS ECONOMICAL.

Some Examples of Work with Two-Ton Kissel Machine That Show Profits.

H. R. Oglesby of Springfield, Mo., the owner of a two-ton KisselKar machine, has from experience realized that the real productiveness of a motor service wagon is keeping it moving, and that the economy of time is as practical in the short haul as in the long, although the actual mileage of either class of work may differ very much. That this statement may be clearly understood one may regard one as a continuous run, and the other as a number of trips between points not far distant. With the first the time necessary for loading and unloading is but a small part of the aggregate in service, but without a return load the work is really less than half the time engaged. With the last the time of loading and unloading is relatively greater, but with sufficient help the truck could be kept on the road a great deal more than might be assumed was possible, and there would be a decided gain in efficiency when contrasted with work done with other vehicles.

These statements are borne out by some of the experiences of Mr. Oglesby, whose longest trip was from Springfield to Buffalo, Mo., a distance of 40 miles, carrying 4680 pounds of oil. The distance was not excessive, but the road is through the Ozark mountains, traversing a very rough country and at one point a 40 per cent. grade is met. This has usually been an obstacle that other trucks could not climb.

In contrast with this is given the work of a trip of 12 miles, making 19 stops and delivering a load en route, the time required being one hour and 35 minutes. The time required for this work with two horses was four hours. Still another was a trip of 10 miles, carrying 5500 pounds of freight and delivering it in 17 stops in one hour and 40 minutes. With a team of horses from 3.5 to four hours were necessary. One of the best showings made was when 40,000 pounds of potatoes were unloaded from a car, hauled 10 blocks and placed in a store basement, inside of two hours. With this work two helpers were employed and the loading and unloading was rushed. The machine is driven from six to eight miles to the gallon of fuel and from 40 to 50 miles to the gallon of lubricant.

Ten machines a month in 1000, 2000, 6000 and 10,000 pounds capacities will be built by the Utah Motor Truck Company, Salt Lake City, Utah, which recently began commercial production of these vehicles. The name adopted is the Utah.

The announcement was made at the dealers' convention at the factory of the Baker Motor Vehicle Company, Cleveland, O., that the sales of trucks had increased 130 per cent. in the year preceding this present gathering.

WORLD'S MARKET FOR MOTOR TRUCKS.

Conditions Which Must Be Met in Order to Secure Export Business--Possibilities for Sales in the Several Sections---The New Tariff and Its Effect on Imports.

WHILE complete information as to the exportation of automobiles during 1913 is not yet available, and probably will not be for at least two months, the report of the Department of Commerce for the first 10 months indicates that the total valuation will be not far from \$28,000,000, of which nearly \$2,000,000 will be represented by commercial vehicles. An accompanying table presents the exact figures for both commercial and vehicles shipped to individual countries during the governmental fiscal year ending June 30, 1913. This shows a total valuation of \$26,012,934, of which \$1,737,141 was represented by business wagons.

These figures are of decided interest to the automobile industry, and when considered from the viewpoint of the entire industry are indicative of a most wonderful growth. It is hardly more than 17 years since the first self-propelled road vehicle was imported into this country by Kenneth Skinner of Boston. During

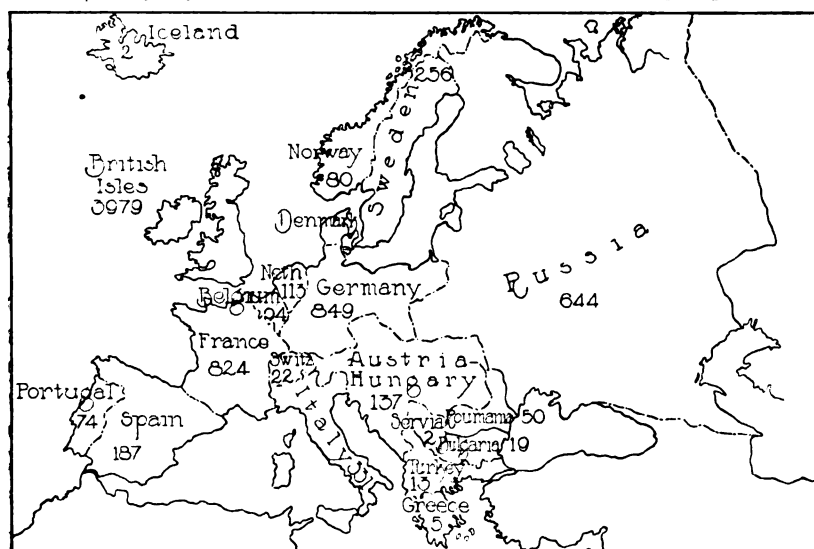
give them the required assistance in this respect.

Where an attempt is made to do business direct with the dealer in a foreign country, it usually becomes a question of receiving the cash before the goods are shipped. This has its disadvantages, because the dealer may have difficulty in securing the ready money, either to establish a drawing account in America or to pay for each car when ordered. As a result the sale of machines is retarded.

Extension of Credit.

When the manufacturer is able to be represented abroad by a direct factory branch or through a subsidiary export company, the matter of extending credit to the dealer is assumed by these. This does not materially change the conditions, however, except insofar as the foreign representative has more ready access to the sources of information concerning the applicant for credit. When the dealer is located at a substantial distance from the branch or exporting company, the same general rule applies as when he seeks to do business with the factory direct.

In doing business with an outside export house, the factory deals with that house alone. The latter is free to extend credit or demand cash, as the case may be, and it is stated that the same rule, of cash before delivery, usually applies in this instance. The export house has the advantage of dealing in a wide variety of articles—practically everything that is produced in America—and is in a position, through its confidential agents in the several commercial centres, to make its own terms with the local dealer. It follows that the general rule is to pay cash for the car upon delivery in New York,



Map of Europe, Showing Number of Cars Shipped to Each Country.

the first 10 months of 1913 the total imports aggregated \$983,445, as against \$1,573,584 for the same period in 1912 and \$1,657,281 during the same months in 1911. Something more, with reference to the imports, will be said later, but the chief purpose of this discussion is to present some of the conditions entering into the matter of exports.

How Business Is Transacted.

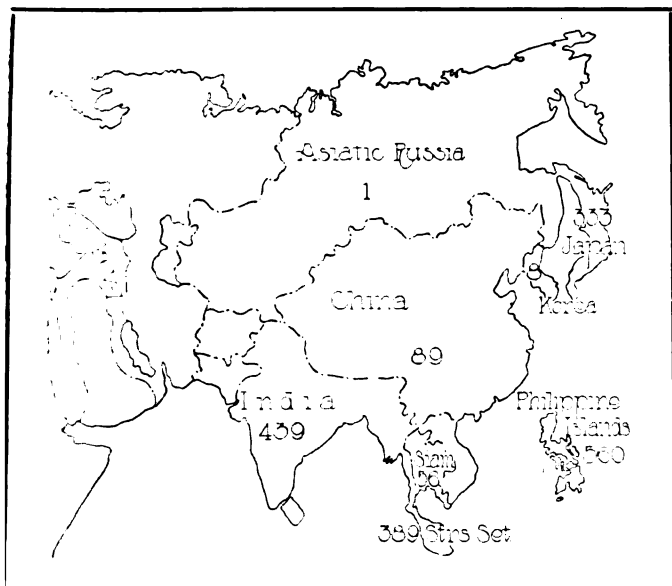
In the first place, it may be stated that the exportation of \$28,000,000 worth of automobiles is not brought about without careful attention to details. Some manufacturers maintain direct factory branches in certain foreign countries from which the cars are reshipped to their destination. Others have formed separate exporting companies in this country. A few do business direct, while a majority look to the export houses on the Atlantic and Pacific Coasts to

Philadelphia, Seattle, San Francisco or other port, and either extend credit or demand cash from the dealer as the circumstances appear to warrant from the knowledge of the situation supplied by its representatives.

Necessary Expenses of Exportation Methods.

Only one condition has been considered in the above. Obviously the exportation of one or a number of cars is not without expense to the manufacturer. When business is done through an export house the car is sold by the manufacturer at the regular dealer's price, at which price, plus the freight, and the duty if any, it is resold to the dealer in the foreign country. The export house secures its remuneration from a commission on the sale, paid by the manufacturer.

It may readily be understood that the expense of maintaining a factory branch in a foreign country is



How Cars Were Distributed in Asia.

considerable, although it may be conceded, at least for the sake of argument, that some of this might be passed along to the dealer. The subsidiary export company also has its expenses, and much the same may be said concerning these. In dealing direct, the cost of securing business is governed very largely by the manufacturer himself, and may be much or little as the possibilities seem to indicate is desirable.

Existing Market Conditions.

For the purpose of securing reliable information concerning the world's markets for automobiles, the writer recently interviewed a number of men who are in close touch with the actual conditions in various world centres. These included representatives of export houses, who either have just returned from the country in question or were in receipt of recent reports from their confidential agents in the field. Some of them have been exporting automobiles since 1902, and are still making periodical business trips into sections of the globe concerning which few Americans are at all familiar, even as tourists. There can be little doubt that the resume which follows presents actual conditions as they exist in the several countries.

Situation in Europe.

Insofar as the European market is concerned, the demand for American made commercial motor vehicles must be limited very largely to Russia, and the so-called Balkan States. In Great Britain, France, Germany, Italy, Switzerland, and some of the other nations, in which the industry is well represented by manufacturers, the home product is almost invariably considered by business men to the exclusion of all others. American manufacturers will find that these concerns are not only strong competitors at home, but in other parts of the world, notably Asia and South America.

The Spanish government makes every effort to encourage home industry, and this is also true of the Italian government. Spanish business men are strongly inclined to follow the example of the government,

and when they fail to find that which they need at home, they usually prefer to do business with Continental concerns. The reason for this lies in the ready accessibility of these factories in the event of need for repair parts, etc. Portugal is still further handicapped by what is considered an excessive freight rate from New York.

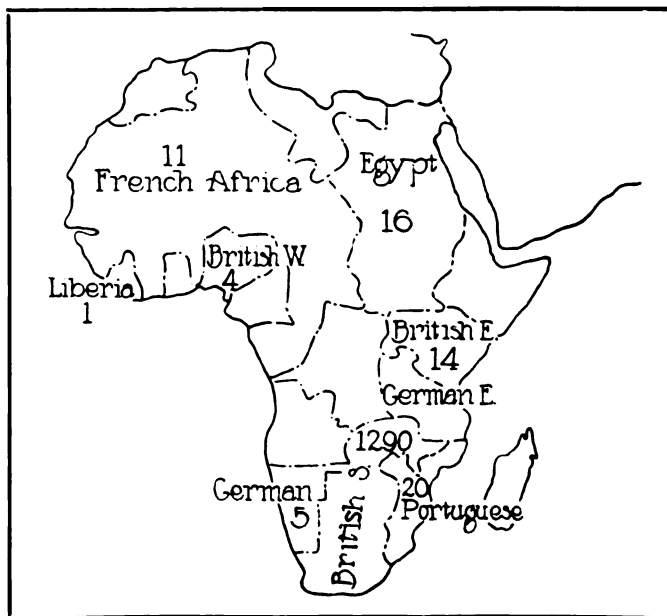
Russia and Balkan States.

The countries of northern Europe, with the exception of Russia, have not become intensely interested in commercial motors as yet, and it is only within the past year or two that they have been purchasing pleasure cars in any great numbers. Even in that field it is the low price of the machine which attracts them to the American product as yet. The Russian government has had excellent success with motor trucks of American manufacture and for this reason such business men as are interested are seeking information concerning these. There appears to be little probability that there will be any decided competition from Russian made machines, at least for the present, since business men receive little financial encouragement to form companies of this character. The road conditions are far from ideal in many sections, particularly in the interior.

The situation with regard to the Balkan States is somewhat problematical as yet, although the successful use of both pleasure and commercial vehicles during the recent Balkan war has had an appreciable effect upon the sale of cars, in that it served to direct attention to the merits of motor vehicles for various purposes. The market undoubtedly will see a number of changes within the next few years.

Asia and the Orient.

In Asia, probably the best market for motor trucks at present is in Siam. Ten per cent. of the total automobiles owned in that country are commercial vehicles. This is due to some extent to the fact that the field has been worked in a systematic manner, largely



American Cars Exported to African States.

by representatives of French manufacturers, who have specialized in motor trucks wherever possible. Many of the so-called native houses are owned by wealthy Chinese, and these are quick to appreciate the advantages of this type of vehicle. Many of the machines are with rated capacity of three and five tons. The greatest handicap for the American manufacturer is the length of time required to secure spare parts, unless some arrangement can be made to locate a spare parts depot within easy access, and it is advisable to have a man on the ground who thoroughly understands the mechanism of the truck.

The Straits Settlements have purchased a number of American cars, and a few American trucks. British motoring prints have suggested repeatedly that this was an excellent market. While it undoubtedly is true that motor trucks would be of invaluable service to the planters and that they could be made to appre-

ple in automobiles. The government is not in a prosperous condition, and this has a decided effect upon business generally, as financial operations depend somewhat largely upon the government's expenditures for internal-improvements, etc. The roads are narrow and must be rebuilt for automobile use in some instances.

China is looked upon as a favorable market, but business conditions cannot be regarded as settled just now. It is probably true that such Chinese as are able to afford machines will be more kindly disposed toward them under the new regime. The scarcity of roads of any description worthy the name will influence their sale in many sections, however.

The Philippines, although under the protection of the American government, are considered as a part of the Orient. It is considered by many that the American government made a mistake in first procuring commercial vehicles of French manufacture, but this has now been remedied, so far as that is possible, and the market for American made motor trucks is held to be very promising.

Situation in South America.

The importance of South America as a market for automobiles of all types is only partially understood by the residents of the United States. Opinions regarding the people of Latin America have undergone a decided change within the past few years. This applies more particularly to the automobile industry, but it has its application to every line. The country is rich in natural resources, and many large cities have grown up along the coast. The people are accustomed to buying the best.

Contrary to the accepted view in the United States, the Latin Americans have no political feeling against this republic—at least, any feeling that they may have is not such as to interfere with commercial intercourse. There is a belief among them, however, that whenever they desire to purchase the best they must go to Europe for it, not because high grade products are not manufactured in this country, but because South America never sees them. They maintain that when they order such goods from America they invariably receive poor treatment.

Why Development Was Retarded.

Numerous examples are cited to bear out the assertion that the United States considers South America a suitable dumping ground for goods that are entirely unsalable in this country. The development of the automobile market in Brazil, Argentina, Chile, etc., undoubtedly was delayed much longer than necessary by the fact that certain concerns failed to realize the importance of the initial orders.

One case will prove sufficient to illustrate the point. A well-to-do Brazilian was visiting in New York City and had opportunity to judge of the merits of a high grade American car. Before returning home he placed an order for one of these machines, paying some \$8500 in cash. When the car arrived in Brazil it was found to be minus certain parts essential to its



Indicating the Market in South America.

ciate this view of the situation, the present price of rubber probably will have the effect of postponing action until the financial condition improves.

There is held to be a satisfactory market for a limited number of machines in India, although it must be remembered that the percentage of people in that country who are financially able to own automobiles of any type is comparatively small. This applies to native houses. Many of the transportation lines are owned by Europeans, and these are influenced somewhat by national prejudice, although it has been possible to overcome this in a large measure with respect to pleasure cars during the past year.

Japan, China and Philippines.

In Japan, financial conditions are such at present as to make it a little more difficult to interest the peo-

A cablegram resulted in the shipment of parts another and an older model, which could not be applied to the car in question. The purchaser never was able to use his machine, and over \$8500 was expended for nothing.

It might be contended that this was an isolated case, but exporters assert that they are continually bringing similar stories, making it exceedingly difficult for interested parties in certain localities. Of course, only good American cars and trucks have been shipped to South America during the past two years, and these are giving excellent satisfaction. Germany, France and Great Britain are serious contenders for business, and Americans must expect keen competition. The long delay in securing spare parts makes it impossible to establish service depots wherever practicable.

Present Market Conditions.

Perhaps the best South American market is to be found in Argentina, for it is in this republic, and in Brazil, that by far the larger number of commercial vehicles is owned. Road conditions in Argentina have been improved to a larger extent than in practically any other South American republic, and this work is being carried on rapidly in several sections. Just at present the country is undergoing a financial depression, and it is stated that several hundred thousand dollars worth of cars are being held in storerooms and warehouses, there being no demand for them. This is, of course, a temporary condition, which undoubtedly will be overcome in due time.

Road conditions, outside the larger cities and towns in Brazil, are by no means as good as in Argentina, and this road work is not being prosecuted as energetically. The market seems to be fairly good. The same situation applies in Uruguay. Much road work is under way in other South American countries, particularly in Venezuela, which has proved to be a very good market for American cars and trucks. The demand for automobiles of any type is still limited in some of the other countries, but the work now being done by American manufacturers, their representatives and the exporting houses, is believed to be such that when it is possible to do business on a larger scale the United States will get its full share.

Africa and Australia.

Africa is rightfully considered a new country. Americans are free to compete here on equal terms with all other countries. In many instances American manufacturers have been able to place orders in advance of any other maker. This is particularly true of British South Africa. The motor trucks sold on that continent have given excellent satisfaction, and there seems to be no reason why other sales should not follow. Road conditions are improving rapidly, and the market undoubtedly will keep pace.

Australia, Tasmania and New Zealand are in the same position, the people being very favorably disposed toward American products. The road conditions generally are ideal. These islands are so far from the

country of origin in any event that Americans are not handicapped in this respect. It is possible to secure reliable agents in both Australia and Africa. The other islands of the Pacific offer their own problems.

EXPORTATION OF AMERICAN AUTOMOBILES FOR FISCAL YEAR ENDING JUNE 30, 1913.

	—Commercial—		—Passenger—	
	Number	Value	Number	Value
Austria-Hungary	2	\$3,959	135	\$91,781
Azores			16	10,549
Belgium			94	85,679
Bulgaria	2	1,528	17	11,457
Denmark	3	2,120	81	77,149
Finland			51	53,568
France	6	10,709	818	615,086
Germany	4	4,029	845	764,389
Gibraltar			7	6,576
Greece	1	1,176	4	4,080
Iceland			2	1,016
Italy			331	280,961
Netherlands	2	4,489	111	94,163
Norway	2	2,200	78	66,689
Portugal	1	1,400	73	58,931
Roumania	12	12,000	38	30,337
Russia in Europe	13	34,163	580	484,913
Servia			2	1,160
Spain	1	1,400	186	127,621
Sweden			256	235,918
Switzerland			22	24,965
Turkey in Europe			13	9,814
England	184	119,468	3,783	2,893,785
Scotland			6	8,104
Ireland			6	5,538
British Honduras			1	1,800
Canada	489	1,004,237	6,723	8,229,324
Costa Rica	2	3,643	13	14,955
Guatemala			10	14,892
Honduras	1	3,000	4	8,100
Panama			39	43,432
Salvador			11	13,212
Mexico	35	83,363	235	423,123
Newfoundland	4	8,845	9	10,353
Barbados			7	5,973
Jamaica	4	9,234	62	59,131
Trinidad			43	39,902
Other British W. Indies			7	6,716
Cuba	14	23,639	223	242,686
Danish West Indies	1	4,250	4	2,131
Dutch West Indies			19	14,590
French West Indies			5	3,877
Haiti	3	5,553	38	24,499
Santo Domingo	1	1,858	7	5,382
Argentina	35	78,000	1,062	1,181,735
Bolivia			2	1,493
Brazil	36	75,073	987	1,035,247
Chile			78	109,982
Colombia	3	6,112	110	113,334
Ecuador	1	2,017	74	55,372
British Guiana			18	14,313
French Guiana			1	558
Peru			70	55,646
Uruguay	7	19,280	209	273,253
Venezuela	23	34,291	104	109,499
Aden			15	7,998
China			89	90,456
Chosen (Korea)	1	3,500	7	6,095
British India			439	355,573
Straits Settlements	2	5,588	387	319,247
Other British E. Indies			39	31,245
Dutch East Indies	2	4,840	278	198,378
Hongkong			7	6,673
Japan	21	32,770	312	364,507
Russia, Asiatic			1	1,160
Slam			56	35,934
Turkey in Asia			1	824
Australia and Tasmania	17	23,027	2,083	1,896,990
New Zealand	1	1,201	958	990,837
Other British Oceania			3	2,396
French Oceania	2	3,400	11	14,005
German Oceania			1	350
Philippine Islands	43	91,809	517	577,040
British West Africa			4	2,688
British South Africa	11	9,476	1,279	1,157,895
British East Africa			14	12,802
Canary Islands			10	6,426
French Africa	1	858	10	7,297
German Africa			5	3,175
Liberia			1	805
Portuguese Africa			20	16,102
Egypt			16	10,156

Total993 \$1,737,141 24,293 \$24,275,793

Selecting Shipping Route.

Exporters to the Philippines and Asia are compelled to consider the advisability of shipping by way of the Atlantic or Pacific ports. Time is saved by the latter route, but the expense is greater. This is due to the overland freight charges. Shipments from New York, for instance, to Manila by way of the Suez canal occupy from 55 to 60 days, while they will go by way of the Pacific in 40 to 45. It is probable that the opening of the Panama canal will have a decided effect with respect to all shipments going to the Orient.

New Tariff and Imports.

By far the largest proportion of machines imported into this country are handled by importers in New York City. Among these Emanuel Lascaris is regarded by importers and dealers in American cars in that city as best informed respecting the market for foreign cars and trucks. He maintains that the reduction of the tariff on chassis, from 45 to 30 per cent., will have little effect upon this phase of the situation. In addition, he holds that American manufacturers will

REVIEWED CONVENTION PAPERS.

The December meeting of the Electric Vehicle Association of America was held the evening of the 16th, when the members were the guests of the United Electric Light & Power Company at its new auditorium at 654 West 187th street, New York City. Prior to the meeting the members had opportunity to inspect the sub-station building of the company, which is one of the most modern of its kind. The greater part of the evening was given over to reviewing the papers presented at the Chicago convention of the association, these being discussed from varying viewpoints and to considerable length. Following the discussion a collation was served.

MUST PAY FULL DUTY.

A chassis of a motor vehicle built in this country and fitted with a body made abroad, when brought to this country from a foreign nation, may be taxed an import duty of 45 per cent. and the ad valorem required under the tariff law of 1909, according to the determination of the board of United States general appraisers in the case of the General Motors Export Company. This concern imports vehicles of American and foreign manufacture, and maintained that the chassis, being made in this country, and being returned unimproved, was not subject to duty, but the body only was to be taxed on the basis of 45 per cent. The board rejected this claim and stated that as the company had not complied with the customs regulations concerning American productions returned to this country, full duty must be paid. The decision is of decided importance to all manufacturers.

COMPARATIVE COMPILATION FOR FIRST 10 MONTHS.

Exports—	1911		1912		1913	
	No.	Value	No.	Value	No.	Value
France	336	\$413,030	585	\$439,313	714	\$546,090
Germany	95	112,121	392	316,201	890	775,466
Italy	167	192,339	254	224,436	277	241,180
United Kingdom.....	2,776	2,407,373	4,207	3,163,696	4,183	3,184,530
Other Europe.....	685	635,378	1,340	1,098,761	1,565	1,355,249
Canada	4,300	4,770,911	6,393	7,704,772	5,558	7,473,333
Mexico	210	351,007	198	320,592	199	362,733
W. Indies and Bermuda	236	270,994	273	283,116	405	397,538
South America	766	967,358	1,586	1,817,988	2,271	2,554,210
British Oceania.....	1,729	1,602,383	2,849	2,586,185	2,774	2,585,389
Asia and other Oceania.	645	647,067	1,321	1,310,323	2,001	1,969,777
Other countries.....	221	238,161	620	570,728	1,892	1,644,585
Totals.....	12,196	\$12,608,127	20,018	\$19,836,111	22,729	\$23,090,080
Imports—						
France	262	\$567,665	384	\$914,639	158	\$370,272
Germany	129	280,385	45	105,131	78	205,931
Italy	100	159,188	80	129,551	74	137,373
United Kingdom.....	127	305,531	115	278,533	42	128,993
Other countries.....	155	344,512	70	145,680	65	140,876
Totals.....	773	\$1,657,281	694	\$1,573,584	417	\$983,445

be compelled to adopt new methods of doing business, eliminating the practise of making liberal guarantees. This, he says, is due to the fact that no manufacturer can guarantee his product in the hands of drivers who either do not know or will not take the time to learn how to handle a car. He believes that it is because makers of imported trucks will not permit such liberal treatment that the number of foreign trucks in the hands of users in this country is so limited.

It is of interest, in this connection, to study the latest monthly report of the Department of Commerce covering the importation of cars since the new tariff went into effect. Previous to Oct. 1 the average monthly importation for 1913 was 43 cars, pleasure and commercial, valued at \$100,977. During October there were imported 29 cars, valued at \$75,646. It undoubtedly is too early to judge of the business that will be done in imported machines as a result of the tariff reduction, but the figures for the first month under the new law are none the less interesting.

The Kleiber Company has been organized at San Francisco, Cal., to manufacture service wagons. Paul Kleiber is president, W. M. Remensperger and Edward Kleiber vice presidents, P. F. Rathjens treasurer and O. T. Suden secretary. A machine is now being designed and it is proposed to build it in several sizes. The officials of the company maintain that 100 machines will be produced the coming year, and that these will be marketed on the Pacific Coast.

The advertising department of the General Motors Truck Company, Pontiac, Mich., is now in charge of John E. Baird, who was advertising manager of the Kingman Plow Company, Peoria, Ill., and previously editor of the Implement Trade Journal at Kansas City, Mo. Mr. Baird will also be identified with the sales department to a certain extent.

ADAMS MODEL T TRUCK.

Quickly Convertible Body Equipment Adapts the Machine for Many Purposes.

The model F truck chassis, built by the Adams Motor Company, Findlay, O., which is one of the most important productions offered in the market by that concern, was designed to meet the requirements of those who have work differing widely in character, and not sufficient volume to justify the purchase of several machines having permanent body equipment. The chassis is of two tons capacity and it is practically the same as the model E, aside from the wheelbase and length of some of the components. In every other respect it is the same in design and has all the features that make the Adams machines distinctive. The wheelbase is 115 inches, this making for convenience of operation in traffic and where the conditions are congested or limited, and there is no loss in capacity because of the shortening of the machine.

The chassis is built to endure hard service, and the frame is built of a special high grade of steel, the channel section being pressed to shape. The members are liberal in size and are reinforced and well braced with gusset plates. The frame is mounted on heavy semi-elliptic springs and the axles are of large proportions. The wheels are 36 inches diameter and are shod with solid demountable tires, four inches width single forward and 3.5 inches width dual rear.

The motor is a four-cylinder, water-cooled type, rated at 30 horsepower, that is mounted forward of the dash under a hood of the French type, and the radiator combined with the dash, this affording protection to the cooling system and accessibility of the engine for examination or work.

The body equipment consists of a regular platform loaded with stakes and sideboards, that is removable from the seat back, having a loading space of 87 inches length and 54 inches width regularly, but this can be made to any dimension up to 100 inches width and 96 inches length, these being the maximums recommended by the builder.

With the removing of this body, which can be accomplished very quickly, the chassis can be equipped with a steel dumping body, hot riveted and amply reinforced, that has inclined sides and bottom. This body will contain one, gravel, sand, etc., or 10 cubic yards of crushed stone or tons of coal. The body is mounted on the chassis and is discharged by a trap in the bottom, the load dropping by gravity almost instantly be-

neath the rear end of the body. The body may be loaded by gravity wherever this is possible, and the discharging is controlled by the driver by two hand levers at the left side. The truck can be driven wherever desired and the load discharged, the discharging chute closed and the machine started in about a minute. The control of the body is extremely simple and there is no possibility of failure or breakage, and it will operate positively. In working the truck the driver need not leave his seat. The truck is furnished with the two types of bodies, making it a very useful vehicle for builders, contractors and others who haul differing materials. With both bodies the machine can be utilized for practically all work.

The Stewart-Warner Speedometer Corporation has established additional branches at Atlanta, Ga.; Cincinnati, O.; Kansas City, Mo.; Los Angeles, Cal.; Minneapolis, Minn.; Philadelphia, Penn.; Pittsburgh, Penn.; Portland, Ore., and St. Louis, Mo., this making a total of 17 thus far opened.

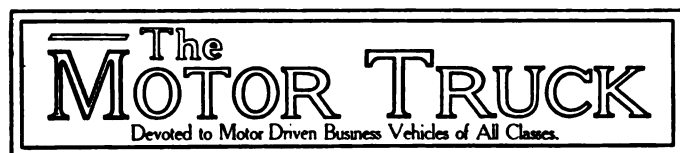
Because of the demands for increased production, the Rowe Motor Truck Company, Coatesville, Penn., has acquired factory property at Downingtown, Penn., and the business will be carried on at that place in the future.

Dr. D. B. Bundy of Cincinnati, O., has been named as assignee of the Crescent Motor Truck Company, Middletown, O., which has become financially involved. The assets are stated to be \$2200 and the liabilities are considerably in excess of that amount.

The Northwestern is the name of a 2000-pound delivery wagon that is being built by the Star Carriage Company at Seattle, Wash., the machine being the design of August Greyerbehl and J. G. Eyler, who are the principal owners of the concern.



Adams Truck Designed for General Utility, Fitted with a Platform and Used with Interchangeable Bodies.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

PROSPECTS FOR THE INDUSTRY.

Because there is a general disposition by business men to economize is no reason to believe that industry or commerce will stagnate. Good judgment demands that economy shall be obtained, no matter what the prevailing conditions, although this is frequently defined as efficiency, and means the promotion of production or the stimulation of endeavor to bring about greater returns at the same expense, or the same results at a lessened cost.

One of the largest financial burdens borne by the people is the cost of transportation, and any material reduction in this will be a distinct saving, because there is nothing constructive resultant from it, and it may be likened to a rental paid for a property in this respect. The education of the people to the possibilities of the use of the highways, instead of paying the prices exacted by companies operating transporting enterprises, will, no doubt, result in a very much larger utilization of motor vehicles for business purposes.

The industry is in its infancy. That there will be great development in design, construction and use there is no doubt. Those who desire economy can only obtain it through the study of the subject, and with reference to highway haulage the motor vehicle industry and the trade will profit just so far as endeavor is made to teach the public the possibilities of motorized vehicle equipment. The business man who wants to use motor trucks and wagons must be practically educated to what can be accomplished with them, and not

left to his own resources after he has purchased machines. The example of other industries could be consistently followed in the event of absence of originality, but the concern that is far-sighted enough to have transportation experts, whose service will be available to its customers, will find a very general appreciation of its policy that will be substantially rewarded.

LONG DISTANCE ROAD HAULAGE.

The highways are practically open to the public for the haulage of freight. The limitation of animals for transportation is well enough known, but the possibilities with motor vehicles are little understood. Those who have engaged in freightage in competition with steam and electric railroads have met with widely varying conditions, and have been compelled to work out their own problems. One of the most frequent mistakes is the continuance of methods that were the vogue with horse vehicles, and when this fault is combined with neglect of the machines the results with motorized equipment have not been satisfactory. The purchase of a motor vehicle means the acquisition of a property that can do a stated work, but its productiveness depends entirely upon the owner. Long distance haulage promises much, because in such work the proportion of idle time is less than in short hauls, and business men will consistently support what will create competition with railroads and express companies and directly benefit them.

UNIFORM HIGHWAY LAWS.

States that have highway systems usually have standards of construction, and generally these differ. Supervision, maintenance and repair are often left to the judgment of men who are selected more for their political influence than their knowledge of engineering, and construction is frequently as cheap as the supervising engineers will pass for the contractors. Administrations and methods are frequently changed and new policies are adopted. The same condition obtains with towns and cities. The result is that highways and streets are poorly built and neglected and yet at enormous cost.

While it is true that available materials will differ and the expense cannot always be uniform, there is no reason why standards cannot be adopted for building and maintenance, and the same supervision insured throughout all cities, towns and states. The statement is made that engineers are not agreed as to material specifications or methods, but this will be found true in every phase of engineering, so that this is not an argument why there should not be endeavor made to establish standardization in road making. The impossibility of reconstructing what has already been built is evident, but new work can be standardized and reconstruction can be made to conform to recognized specifications.

SAVE COST IN NINE MONTHS.

Great Economy in Lamp Bulb Haulage by Truck and Trailer Equipment.

The National Lamp division of the General Electric Company, by the use of a special Peerless truck trailer equipment has realized an economy in the age of electric lamp bulbs that equals the investment in nine months, and this principally from saving labor and lessened breakage. The company has a factory at Niles, O., and the bulbs used for manufacturing incandescent lamps are produced there. It is necessary to deliver the bulbs at the lamp factories at Westinghouse and Warren, that state, and the plants can only be kept in operation by continuous delivery of bulbs.

Formerly the bulbs were sent by freight, and to minimize breakage it was necessary to pack each bulb, wrapping it in tissue paper and placing it in a tray. The labor of packing was considerable and despite the best care many were broken in transit. The bulbs are very light, but bulky, and a carload was based on bulk and not on weight. The company decided to use highway haulage. A special Peerless chassis, wheelbase of 204 inches, was bought and on this a body was installed, this having inside dimensions of 17 feet eight inches length, seven feet width and eight feet four inches height. This body has out-sliding side doors, so the full capacity may be used.

The weight of a load for this body, which will hold 100 cubic feet, is less than a ton, and to utilize the power of the machine a trailer was built, this having a frame of channel angle iron mounted on springs and rear and front axles, the wheels being of standard size and shod with solid tires. The trailer is controlled by a drawbar or pole that has a short arm or bracket that is linked to the chassis frame, with a longer arm pivoted on the front axle and which is connected with the centre of the tiebar that extends across the rear of the tail levers on the front axle pivots. Turning the handle from one side to the other swings the wheels and the trailer, while chains are attached parallel the drawbar during straight pull ahead pre-strain that will bend the handle and cause the trailer to follow the track of the truck. On the trailer is installed a body the same size as on the truck. The truck and trailer bodies have a combined capacity equal to the average box freight

macadam and brick paving, with surfacings that are poor for the first two and good for the last. The average mileage daily is 35, and the load will range from 3000 to 4000 pounds for the truck and trailer. The actual cost of haulage is very close to that for rail shipments in carloads, but there is the saving of labor in packing and unpacking, and the breakage is less than half when the bulbs were carefully packed and shipped by rail.

STATE TO USE MOTOR TRUCKS.

If the plans proposed by the New York highway commission are realized the state will purchase a number of motor trucks for use by that department, these to be utilized in maintenance and construction work. Trucks have been used with success by contractors and these types will be purchased and fitted with dumping bodies, tank apparatus and equipment necessary or desirable. With the increase of mileage of improved highways the maintenance work has greatly increased, and the desire of the department is to have such facilities as will make its endeavors in every way practical.

WILL BUILD TRACTORS.

The Mercury Manufacturing Company, Chicago, Ill., has built for a disposal works a tractor having three wheels, the single forward wheel being used for steering and the traction being afforded by the two driven rear wheels. The machine is intended for road work with trains of trailers of ton capacity, the number of units depending upon conditions. The frame of the machine is short and at the rear the chassis resembles the conventional truck. The forward wheel is mounted in what is termed a fifth wheel, it being turned on a table to any angle desired. The motor power is furnished by a 40 horsepower motor and the drive is by jackshaft and side chains. The tractor, with the driver, weighs approximately 6000 pounds.



Peerless Truck and Trailer Used by the General Electric Company for Freighting Between Its Niles, O., Glass Plant and Its Lamp Factories.

roads between Niles and Westinghouse are dirt, worn

ELECTRIC VEHICLES IN CANADIAN CITIES.

SNOW is believed by many to be the greatest obstacle to highway vehicle traffic, and snow falls are apprehended with a considerable degree of uncertainty when a stated work is expected of either animals or motors. It is well enough known, however, that in those sections of the country where snow is frequent and accumulates to considerable depth during winter, the steam and electric railroads have no more difficulty in operating than in other localities where the heaviest winter storm may bring five or six inches.

It is the custom to associate the climate of Manitoba with very low temperatures and heavy storms, and a belief very generally prevailing is that road haulage is very difficult a great deal of the winter months. But as a matter of fact the continued cold weather and the absence of the constant thaws of lower latitudes afford substantial roadways, the worst experience being in the spring when the snow and ice melt and the ground is water saturated.

That more than 40 electric wagons and trucks are

direct from the manufacturer. In contrast with this condition the statement may be made that there are from 15 to 20 agencies representing the best known gasoline wagons and trucks.

Winter Weather in Toronto.

To understand the winter conditions in Toronto a comparison may be made of the snow fall in that city and in Detroit and Chicago for two years, which will probably be accepted as representative. During the winter of 1910-11 the precipitation of snow was as follows: Chicago, 29.6 inches; Detroit, 50.2 inches; Toronto, 61.3 inches. Winter of 1911-12, Chicago, 39.6 inches; Detroit, 58 inches; Toronto, 76.4 inches.

The experience of users of electric vehicles in Toronto has been that mere low temperature has no appreciable effect whatever on electric truck efficiency, and that there is not the loss of mileage capacity that is resultant from use in mud or sand, the latter condition being quite as much realized with gasoline machines as with electrics. In fact, the rainy and muddy periods of the spring and autumn are the greatest de-



The Fleet of Five Detroit Electric Wagons in the Service of the Robert Simpson Company's Department Store, Toronto, Ont.

in use in Winnipeg may be a surprise to those who believe the highways in that locality are obstructed half the year, and an awakening of those who believe that the winter weather, such as is usually experienced in New York, Boston, Philadelphia, Buffalo, Detroit, Chicago, Milwaukee and other cities in the northern half of the United States, would militate against the efficient operation of electrically driven machines.

As a matter of fact the electric vehicles used in low temperatures have been found in every way dependable, and that doubt exists is due largely to the lack of accurate knowledge of results. Information of the operation of electric vehicles is not general and supposition has led to opinions that have no foundation in fact. This is especially demonstrated in Toronto, where the snow fall is exceedingly heavy, by the use of 32 electric wagons and trucks, some of which have been used for years with very satisfactory service at all times. Up to the summer of 1912 there was not an electric vehicle agency in Toronto, and, in fact, all the electric service wagons ever sold in that city have been either bought through the one pioneer agent, or

terrents to a wider use of motor vehicles in Toronto. In the suburbs are many unpaved streets where new building operations, new stores and new residences must be reached, and these are softened and badly cut by the vehicles used in them. The more the traffic the greater are the difficulties met with and the corresponding loss of time. During the last three years the electric wagons used in Toronto have never been withdrawn from work save such short period after severe blizzards that necessitated at least a partial cessation of all horse and motor haulage.

Electric Users in Toronto.

The oldest user of electric vehicles in Toronto is the Verral Company, which conducts a public service, operating nine sight-seeing machines and a taxicab. The fleet consists of a 20-passenger Riker wagonette 10 years old, three Commercial 38-passenger wagons seven years old, five Motor Car Equipment Company's 38-passenger wagons six years old, and a General Vehicle taxicab more than seven years old. Of these the material for the Commercial machines was bought and the vehicles were assembled in Toronto. The sight-

g electrics are used during the spring, summer and autumn, making regular trips about the city, and during that period as many miles as many horses in regular service make during a year. Despite the machines are comparatively old they are giving entire satisfaction despite the hard work required of them. The taxicab is driven the entire year, and the idea of the work done can be gained from the fact that since June 1, 1913, it has been run more than 100 miles.

The other users of electric service machines in Toronto are: Robert Simpson Company, department store, five Detroit wagons; Heintzman & Co., piano manufacturer, one Detroit wagon; Murray-Kay Company, furniture, one Detroit wagon; M. Langmuir Manufacturing Company, trunk manufacturer, one Detroit wagon; Holt-Renfrew Company, furrier, one Detroit wagon; T. R. Estabrooks Company, tea importer, one Detroit wagon; Bowles Lunch, Ltd., restaurateur, one Detroit wagon; McClary Manufacturing Company, stove manufacturer, one Detroit wagon; O'Keefe Brewing Company, brewer, four General Vehicle trucks; Canadian Express Company, three General Vehicle wagons; Toronto Electric Light Company, one General Vehicle and one Waverley wagon; Central Press Agency, Ltd., one Waverley wagon.

The O'Keefe Brewing Company was the pioneer user of electric trucks in Toronto, having used two trucks through three winters, and two others that were bought the following year. The test of the winter of 1910-11 was the reason for the purchase of the third pair. The Holt-Renfrew Company used a machine at Winnipeg during the winter of 1911-12 before the wagon now at Toronto was purchased, and the latter vehicle is now working in its second year. The machines of the Canadian Express Company, Heintzman & Co., and the Langmuir Manufacturing Company have all been worked through one winter at least, and the results obtaining with continued operation of the first wagon prompted the purchase of four additional wagons by the Robert Simpson Company. The Simpson Company uses its machines for general purposes, including parcel delivery, furniture haulage, warehouse transfer work, and with entire satisfaction to the concern and its customers.

The experience of the firms that have been stated has been practically the same so far as efficiency is concerned, although service requirements vary materially, and continued use has demonstrated that electrics are in every way dependable and reliable. With improved road surfacing the economy would be even greater, but this result would obtain whatever type of vehicle was used, either electric, line or animal drawn.

MAMMOTH GOODYEAR PLANT.

Factories Have Floor Space of 35 Acres and Employ More Than 6500 Hands.

The factory plant of the Goodyear Tire & Rubber Company at Akron, O., which has been developed within a very few years, is one of the largest and most modern rubber manufactories in the world, it being an example of the almost marvelous increase of the motor vehicle tire industry. The plant is located on a tract of 50 acres, this large area being acquired to provide for expansion and to insure railroad and other facilities essential to economical and satisfactory operation.

The buildings are of the most substantial and approved construction, having a floor space of 1,500,000 square feet, or approximately 35 acres, and in these about 6500 people are employed. The power plant is very large, having steam boiler capacity of 12,000 horsepower, turbo-generator capacity of 8500 horsepower, and a steam engine capacity of 7250 horsepower. The plant is equipped throughout with machines and tools of large capacity and modern construction, the purpose being to insure high class production in great quantities. The plant can produce 10,000 pleasure car tires daily, in addition to the immense output of motor truck, motorcycle, bicycle and carriage tires. The mechanical rubber goods department, which was established less than a year ago, is constantly increasing its production, including belting, hose, packing, etc., which is fast becoming recognized by the trade as equal in quality to other Goodyear products.

The Lloyd Auto Delivery Company has inaugurated business at Jackson, Mich., and has in service six Commerce delivery wagons that are driven a daily average of 35 miles, the routes being over all kinds of paved and unpaved city streets and country roads. The company has contract for the delivery of a number of stores of Jackson, and adopted the Commerce machines after careful inquiry into the merits of a number of vehicles of the size required.



Factory of the Goodyear Tire & Rubber Company, Akron, O., on a Site of 50 Acres, Having 1,500,000 Square Feet of Floor Space and Employing 6500 Persons.

PRACTICAL PURPOSE TRUCK.

Wichita Two-Ton Machine Designed for Endurance Under Severe Conditions.

The model B truck chassis built by the Wichita Falls Motor Company, Wichita Falls, Tex., is constructed to a design developed for all the vehicles produced by this concern, and differs from the model A machine merely in frame and other proportions, the power plant being the same. The chassis is designed for long endurance under severe operating conditions and with a wheelbase that will make it a convenient machine in congested traffic and where the space is limited. The components are heavy and of material that will insure hard service, and the construction is simplified to afford accessibility and to economize labor in attention and maintenance care.

The power plant is especially well developed, the motor being a four-cylinder, water-cooled, L head type, cast en bloc and so built that work on it may be done with a minimum of labor, dismantling not being necessary even for an overhaul. The cylinders have bore of 3.25 inches and stroke of five inches, this giving a horsepower rating of 16.7 by the S. A. E. formula, but the claim is made by the maker that with the bore to stroke ratio of 1:1.65 at least 25 brake horsepower is developed. The crankcase is a barrel type with large bolted-on plates carrying the end main bearings, and with a base that forms the oil reservoir. By removal of the base and the end plates, and after loosening the connecting rod big ends, the crankshaft may be drawn out without difficulty. The timing gears are forward of the front end plate and are housed in a case that is separate from the crankcase and has independent means of lubrication.

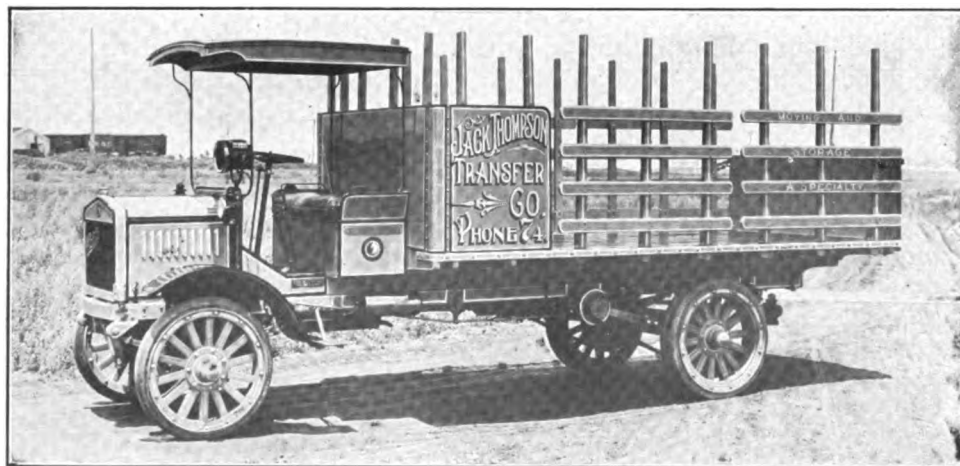
The valves are at the left side of the motor and the mechanism is not enclosed. The crankshaft is very large and is carried on extra long main bearings provided with case hardened sleeves, pressed into position and ground to a fine finish. The bearings are a special nickel bearing metal. Great care is taken to finish

the cylinders and pistons. The valves are provided with cover plates that afford convenient access to the valve pockets and cylinders, so that carbon may be easily removed. The valves have cast iron heads electrically welded to nickel steel stems. The valves are operated by a one-piece camshaft, that drives the oil pump, and the magneto is driven by a gear that meshes with the camshaft gear. The magneto is located on a bracket mounted on the left side of the crankcase, where it is protected by the frame of the chassis.

The motor is cooled by thermo-syphon circulation of water through large cylinder jackets, ample manifolds and a radiator carried on trunnions at the front end of the chassis, radiation being insured by a six-bladed fan mounted on a shaft in a ball bearing bracket, driven by an adjustable belt from a pulley on an extension of the crankshaft. The engine is lubricated by a combined splash and mechanical force feed system, the oil circulating through a glass indicating gauge installed on the dash. The ignition is by either Bosch or Eisemann magneto, and the carburetor is an automatic float feed type.

The clutch is a leather faced cone of ample proportions and the power is transmitted by shaft through a gearset of a sliding gear selective type having three forward speed ratios and reverse, and thence to a jackshaft and side chains to the rear wheels. The frame is a pressed steel channel construction, carried on semi-elliptic springs, the rear suspension being with outside brackets. The front axle is an I section and the rear axle a rectangular section, both drop forged from high grade steel. The chassis is right side drive by a worm and worm wheel system, with centre speed changing and emergency brake levers, and with the ignition and fuel control levers mounted on the steering column. The service brake is operated by a pedal, having shoes expanding in drums on the jackshaft, and the emergency brake shoes expand within drums on the rear wheels. The wheelbase is 118 inches and the tread 56 inches. The wheels are 34 inches diameter, having 3.5-inch shoes forward and three-inch dual tires rear, and are fitted with demountable rims. The gasoline capacity is 24 gallons.

The chassis are fitted with varying body equipment suited for any service, and are also equipped with fire department apparatus. The Wichita machines are extremely well known in the Southwest, where a considerable number are in use, but the company has not as yet made a campaign in the East, though it is extending its agencies into the Southern states and the Middle West. The factory facilities are excellent, and the company will later increase its plant.



Model B Wichita Truck, Capacity 4000 Pounds, 144 Inches Wheelbase, Built by the Wichita Falls Motor Company, Wichita Falls, Tex.

ELECTRIC VEHICLE PRACTISE.

Cell Capacity Proportioned by the Size of the Element and the Construction and Character of the Plates--The Effect of the Electrolyte upon the Electrodes and the Relative Endurance of Positives and Negatives.

William W. Scott.

WHILE a cell will have a voltage that is governed by the potential of the electrodes, which fact has been sufficiently explained, the capacity, which is measured in ampere-hours, will increase or decrease as the cell varies in size. Ampere-hour capacity is accepted as the number of hours that one ampere will be delivered. As cells are now made practically on the universal standard of eight-hour charge or discharge, a cell that is rated at 200 amperes, for instance, will deliver 25 amperes for eight hours, and as the discharge rate is increased the capacity will diminish until when discharged in one hour about 100 amperes could be a normal output. This ratio will vary slightly with the form of plates, there being the least loss with

Plante or formed type, and the most with the pure or pasted plate. The output of energy is expressed in watt-hours by multiplying the ampere-hour put by the average voltage of the discharge.

Cell capacity is dependent upon the character, porosity and disposition of the active materials composing the plates, the volume and density of the electrolyte, the character of diffusion, the temperature and the discharge rate. It is understood that with a Plante type the active material is formed on the surface of a sheet of lead, or composition of which lead is the chief element, and the surface is increased by shaping the plate, generally by grooving or corrugations. Plante plates never have the degree of porosity reached with the pure plates and the latter as a rule are more permeable, so that the more complete the saturation of the active material the greater the discharge capacity of the cell. The volume and density of the electrolyte are, of course, material factors. The temperature has not been considered, and the rate of discharge is variable, according to the requirements of the user.

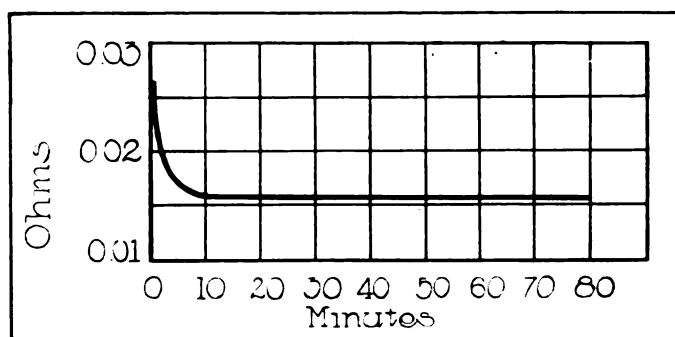
The discharge of the cell from the maximum of charging, 2.55 volts for instance, to a minimum of 1.80 volts, will yield the amperage capacity, these extremes being accepted as standards by battery engineers and manufacturers. To discharge the cell below the minimum would result in excessive sulphation and damage from expansion, distorting the frames and loosening the active material without any useful purpose being served. These standards can be accepted for any rate of charge or discharge.

The best results from cells can be obtained when complete charging and discharging can be accomplished, and the cycles of operation are regularly repeated. In addition to this the cells should be charged as quickly as is possible after being discharged. If a

battery is to be idle for a short period it should be charged to approximately the maximum.

To illustrate the variable character of cell capacity the statement can be made that the ampere-hour output will vary from 40 to 60 a square foot of area of surface of Plante type plates, and from 50 to 75 for plates of the Faure form, the value of the former being dependent upon the depth of the formation of lead peroxide and the construction, and of the latter upon the porosity and thickness of the plates.

Now as to the effect of the electrolyte upon the plates. The lead peroxide coating or film on the positive plate is permeable and it will absorb a considerable volume of electrolyte. The activity of the plate is proportionate to the surface that actually contacts with the solution. The formation of lead sulphate with the discharge is within the pores of the peroxide, as well as on the surface, and as these crystals are not



Example of the Lessening of Cell Internal Resistance Following a Discharge.

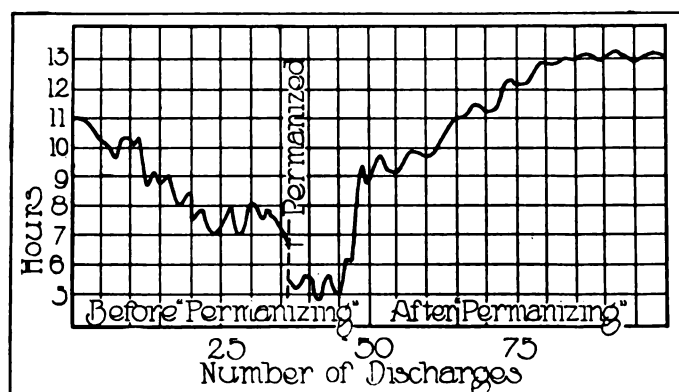
completely reduced by the charging, the accumulations force minute particles of the peroxide from the plate and also reduce the porosity of the peroxide. When the plates are the Plante type, as the active material is loosened and is precipitated the electrolyte forms new peroxide from the lead that is exposed. If the plates are Faure type the same process follows, but the loss is certain because there is no material from which new peroxide of lead can be formed.

While the positive plates should, in theory, because of the lesser degree of porosity, be larger than the negative plates, owing to the porous nature of the sponge lead, experience has taught the necessity of making the negative plates considerably greater in capacity, as the pores of the sponge lead gradually contract from the effect of the electrolyte and the metal becomes less cellular. There is further reduction by the formation of the crystals of sulphate in the cells. Considerable success has been obtained by incorporating porous

material in the negative plates that will not be affected by the electrolyte, such as coke, porcelain or pumice in pulverized form. Another method is to heat the plates to such an extent that they will absorb a material that can be liquified and which will wholly or partially fill the cells and yet be permeable to the electrolyte, although not soluble in it. This process is known as "permanizing" and it is maintained that by its use lost capacity can be restored to negative plates.

Observations demonstrate that negative plates on which the active material is thin will lose capacity faster than those with thicker formation, and that the loss is in proportion to the number of discharges. They gain capacity for a few cycles and then begin to decrease unless they are treated to permanize them.

The action of the electrolyte upon the positive plates differs from that upon the negative plates. Generally the capacity of Faure plates is increased for a short time and then the disintegration of the active material is begun, the minute particles being loosened and precipitated. With the decrease in porosity the capacity of the plates lessens gradually, and finally reaches a point where the cell can practically discharge



Curves Illustrating the Capacity Loss of Plante Negative Plate and the Result Accomplished by Permanizing.

no energy. The Plante plates will increase in capacity for a brief period, and as the active material is lost this is replaced by new formation until the lead of the plate is exhausted.

The variance of capacity with the change from the standard eight-hour discharge rate can be determined by formula, but there are numerous variables that must be given consideration to insure accurate data. For all practical purposes, however, one may assume that the following figures are reasonably correct:

Discharge Rate	Capacity	Discharge Rate	Capacity	Discharge Rate	Capacity
8 Hours	100	5 Hours	89	2 Hours	65
7	97	4	83	1.5	57.5
6	93.5	3	75	1	50

Besides the lessened capacity there is danger of damaging a battery by quick discharge, and under no circumstances should a battery be discharged more than 20 minutes at the one-hour rate, except in emergencies, where a 20-minute rate may be used for a period not exceeding two minutes. A battery can be discharged at a fast rate for a short time to a voltage below what would be safe at the normal discharge

rate. That is to say, that were the discharge stopped at 1.8 volts a cell there would be considerable residual energy remaining that would be manifested by recuperation within a short time. For this reason a quick discharge may show a voltage of 1.60 without damage to the cell, though under no circumstances should there be discharge below 1.75 when discharging at the eight-hour rate.

The greatest efficiency of a cell can be obtained by discharging at the normal rates, and the greatest capacity for work is evidenced after charging slowly. The charging that is accomplished with the least gassing is not only the most economical as regards current cost, but there is minimum deterioration of the plates. Where the charging is variable the output will also vary. That this may be clearly understood it may be well to instance probable conditions and results, assuming that endeavor is made to operate and maintain the equipment as directed by the builder.

Charging may be taken as the first operation of a cycle of a battery cell, and as cell capacity, and of course service and endurance, is dependent upon the number of complete cycles and not upon the aggregate of ampere-hours output, it is apparent that use should be with the purpose of obtaining as near as is possible the practical completion of the full cycle. If, after the charging, the battery is used, and the discharge is slight, use should be continued without additional charge until at least 50 per cent. discharged, even if the discharging is extended over a period of several days. But when discharged below that point it is well to charge it if the rest is to be for more than a few hours, such as intervals between use during a day. One reason for this is the continuation of the formation of sulphate and the increased difficulty of reducing it by electrolysis, necessitating the use of more current than would be required were discharge immediately followed by charging. Another reason is the loss of a portion of the residual charge by the absorption of hydrogen. But the greatest efficiency is when the charging quickly follows the discharge.

Where the charging and discharging rates are comparatively low the voltage curves more nearly approach each other, the former representing the least consumption of current in energizing and the latter, the greatest value in useful work or efficiency. Rapid discharge increases the polarization and the reduction of the concentrated acid in the cells of the plates causes a quick drop in potential. This explains the retention of what is known as the residual charge and the recuperation of the cells, for there is not as complete diffusion when the discharge rate is rapid. Should a cell be charged slowly and then discharged quickly, the current required for the next charge will not be as large as for the previous energizing, for the residual energy is added to until the voltage reaches the maximum. Another slow discharge will develop more energy than was actually put into the cell, this evidencing the accumulation of the charge.

In charging the decomposition of the water in the

electrolyte and the liberation of the acid radical from lead sulphate creates hydrogen gas that is liberated as the charge progresses, and when a certain age has been reached the gas appears in bubbles on the surface. At this point it is customary to reduce the amperage of the current, for the gas represents a loss of energy, and to continue charging until the voltage remains stationary. If the charging is at high rates the degree of diffusion is low and the high concentration of the acid in the cells of the active material causes voltage to raise rapidly. The condition necessitates a higher charging voltage and the energy in excess of that stored is lost. The quick concentration of the acid is accompanied by heating of the cells, and the heat is higher than the temperature caused by internal resistance. The critical point of a lead-acid cell, so far as temperature is concerned, is 110 degrees Fahrenheit, and heating beyond this is regarded as decidedly deteriorating. Discharging a cell is accompanied by a decrease of temperature because of the boiling of the water as the acid is concentrated in the pores of the plates, there being a specific tendency to draw it from internal resistance, but the former influence is by far the greater.

The life of lead-acid cells depends upon the endurance of the positive plates, and in practical operation these batteries two policies are followed by those using them. The one is to renew the element, both positive and negative plates, and the other is to replace the positive plates after a cell has reached a capacity where it will not afford the mileage and use of new and old negatives as an element. This is known as rebuilding, and while some will maintain it is economical, there are others who believe in complete renewal. Renewing the element will certainly afford maximum capacity, but rebuilding is claimed by many to yield practical results at a decidedly reduced cost.

In connection with this the experience of the New York Edison Company is decidedly of interest. The batteries in use in its machines, which number in excess of 100, are operated after purchase until minimum capacity is reached, and then the cells are rebuilt, the material being procured from the manufacturers and the assembling being done in the battery department of the garage. After reforming charges have been given the cells are assembled as batteries and used. An allowance is made for old material returned to the battery makers, and the work is done in the company's shops, the cost is comparatively small when contrasted with the purchase of new cells. Without attempting the make of batteries, which are regarded as being the equal of any procurable in the market, the following results will show the life of the negative and positive plates as taken from the records, an average being given for the vehicles used in differing work:

Eight surreys, used by officials of the company for the transaction of business in and around the city, averaging from 15 to 50 miles daily on one charge:

No. Cells	No. Plates	Life and Mileage of Batteries Positive		Negative	
		Days	Miles	Days	Miles
11	11	368	9380	650	13,000

Eighteen 2000-pound wagons, used as arc lamp and meter wagons and for the general delivery of material to and from station, etc., averaging 30 to 40 miles daily on one charge:

No. Cells	No. Plates	Life and Mileage of Batteries Positive		Negative	
		Days	Miles	Days	Miles
44	15	390	9000	700	15,000

Two 4000-pound wagons used for general delivery and delivering material to jobs, averaging from 30 to 35 miles daily on one charge:

No. Cells	No. Plates	Life and Mileage of Batteries Positive		Negative	
		Days	Miles	Days	Miles
44	16	300	8130	.....	.....

One 5000-pound wagon, two three-ton trucks and one 3.5-ton truck, used for hanging electric signs and street arc lamps, averaging from 20 to 25 miles daily on one charge:

No. Cells	No. Plates	Life and Mileage of Batteries Positive		Negative	
		Days	Miles	Days	Miles
44	x1-17 x2-19	354	5336	424	7,080

Six five-ton trucks, used for pulling and hauling cable and general heavy trucking, averaging from 18 to 23 miles daily on one charge:

No. Cells	No. Plates	Life and Mileage of Batteries Positive		Negative	
		Days	Miles	Days	Miles
48	x5-23				
44	x1-25	395	4000	729	8,250

*Data not complete.
xFirst figures indicate number of vehicles and second the number of plates.

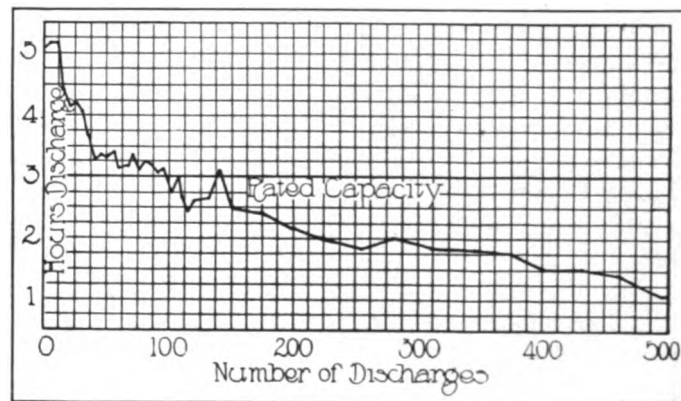


Chart Showing the Decrease in Capacity of Plates or Formed Negative Plates with Increase of Number of Discharges.

Considering these statements for a moment, it is seen that the vehicles range from the heavier types of pleasure cars to large trucks, and that these were worked from averages of 50 miles for the former to 23 miles for the latter, taking the maximum. Rating the positive plates at a value of 100, in the surrey class the negative has a relative value of 1.3560 by miles and 1.7663 by days' service. In the 2000-pound classification the value of the negative plates is 1.7222 by mileage and 1.7948 by days' service. With the 5000, 6000 and 7000-pound vehicles the value of the negative plates is 1.3266 by mileage and 1.1978 by days' service, and with the 10,000-pound trucks the value is 2.0650 by mileage and 1.8456 by days' service. These figures are especially interesting, as they show the actual values of the plates as demonstrated by careful record and practical experience. There is extreme probability that these would be paralleled in similar service and with equally good supervision and care.

The facts relative to the records of New York Edison Company are given at this juncture for the purpose of illustrating the life of the positive and negative

tive plates, and analysis of the mileage averaged for the plates shows that there are surprisingly close results afforded by each, in some cases the average of the positive slightly exceeding that of the negatives, and in others the negatives affording somewhat more than the positives. Considering the numerous variables the results are surprisingly close and seemingly bear out the supposition of economy that prompts rebuilding of the cells and obtaining the fullest value of the elements.

Note should be made of the fact that the batteries referred to in the record were driven in all kinds of weather and in widely varying operating conditions, and the observations covered a period of two years. The experience was with rebuilt cells in 44 different vehicles and they were found to justify the attention given to them. This is probably the most comprehensive practical trial ever made of rebuilding cells and it can be accepted as representative of the values of both positive and negative plates.

(To Be Continued.)

ENGINE BUILDERS ORGANIZE.

Representatives of automobile engine building firms formed at Cleveland, O., recently the Automobile Engine Manufacturers' Association, the purpose of which is general promotion of trade interests. The firms interested in the association are the Rochester Motor Company, Rochester, N. Y.; Lycoming Foundry & Machine Company, Williamsport, Penn.; Herschell-Spillman Company, North Tonawanda, N. Y.; Clark Motor Company, Jackson, Mich.; Sommer Motor Company, Bucyrus, O.; Waukesha Motor Company, Waukesha, Wis.; Buda Company, Chicago, Ill.; Model Gas Engine Works, Peru, Ind.; Falls Machine Company, Sheboygan Falls, Wis.; Northway Motor Manufacturing Company, Detroit, Mich.; Wisconsin Motor Manufacturing Company, Milwaukee, Wis. The officers elected were: President, Charles B. John of the Wisconsin Motor Manufacturing Company; vice president, A. Knobloch, Northway Motor Manufacturing Company; secretary and treasurer, A. R. Clas, Falls Machine Company.

EQUIPPING NEW G. V. PLANT.

The new factory building of the General Vehicle Company's plant at Long Island City, N. Y., is now being equipped with the machinery and machine tools, and it is probable that this work will be completed so that production will be to the normal standard in a very short time. The building is the largest of the group that will be built, being six stories, 750 feet long and 200 feet wide, and constructed of reinforced concrete. It is practically fireproof and contains every desired facility and convenience. It is one of the largest manufacturing units on Long Island. The first five floors will be used for manufacturing electric wagons and trucks, and the sixth floor will be largely

devoted to the offices of the company. The increased capacity of this division will triple the production of electric vehicles.

The building formerly utilized for the building of electrics will be used for the construction of General Vehicle Mercedes six-ton gasoline trucks, the company having the right to manufacture these machines in America, and these will be produced in such numbers as business conditions warrant. The erection of a large garage and other buildings, which will be used for vehicle building later on, will be completed during the coming year. The district managers and other selling representatives were present when the new building was occupied formally.

S. A. E. RESEARCH COMMITTEE.

According to statements made, it is the purpose of the Society of Automobile Engineers to undertake technical research which will be placed in the hands of a committee made up from members of the faculties of several well known educational institutions, and this committee will co-operate with the society along lines that will appear to be desirable and profitable. The committee will be headed by David L. Gallup, professor of gas engineering at the Worcester, Mass., Polytechnic Institute; and it will also include Prof. E. C. Carpenter of Cornell University, Prof. C. F. Locks of Columbia University and Prof. H. F. Thompson of the Massachusetts Institute of Technology. The committee is to test automobile parts and accessories without bias or partiality, and will make its reports to the society. Many of the tests will be conducted at the laboratory of the Worcester Polytechnic Institute.

The Goodyear Tire & Rubber Company declared a dividend of 12 per cent. on its common stock at its annual meeting. It was stated that the value of the production of the company was increased from about \$26,000,000 to \$33,000,000. The company has during the past year begun the operation of a mechanical department, but the greater part of the business is in vehicle tires.

The Chase Motor Truck Company, Syracuse, N. Y., has for the past few months made endeavor to extend its sales organization, and has since this campaign was inaugurated made 54 agencies, which include representatives in 16 states, and in Germany, Peru and Jamaica, as well as 35 sub-agents for a selling agent at Dallas, Tex.

The Stewart Motor Corporation, Buffalo, N. Y., has made agency contracts with the following concerns: Main Street Garage, Akron, O.; F. E. Avery & Son, Columbus, O.; Andrew Murphy & Son, Omaha, Neb.; Stowell Motor Car Co., Syracuse, N. Y.; H. L. Kearns Auto Company, Portland, Ore.

MOTOR TRUCK SPRING DESIGN.

Excessive Strain from Road Shock While Under Stress of Load Requires Careful Proportioning--Dimensions Approved by Manufacturers with Long Experience.

SUSPENSION of vehicles intended for service involves many factors that are not met with in designs for pleasure cars. That these conditions may be better understood it may be well to differentiate them somewhat. The pleasure car is intended to be driven over smooth surfaces, and with comparatively light loads. The weight upon the forward springs is ever greatly varied, but the load on the rear wheels is generally variable. Moving slowly, the road shocks are minimized, and the deflection and reflection of the springs at the rear compensate these to a considerable degree. But with the increase of speed the movement of the springs becomes greater and more time is required for them to return to what may be termed equilibrium, or a state of rest. The heavier the load the more gradual the movement, and as the speed is usually less with the increase of the load the stresses from road shock are relatively reduced. Driving at a given rate of speed over a given surface the movement of the springs is lessened as the load is increased. The

With the pleasure vehicle the easy movement of the spring is sought, the purpose being to have extreme elasticity, depending upon weight of load or shock absorbing devices to reduce excessive movement, while with the service wagon the spring must be elastic when supporting its load, yet when driven without load the springs are stiff and lack elasticity that is regarded as necessary for protecting the mechanism while loaded. This is a condition that cannot be changed with suspension that is not variable. The springs of a vehicle designed for carrying freight are determined with reference to a maximum weight of load, and when this maximum is placed upon them the springs are expected to have a reasonable margin of safety. The value of this factor is dependent upon the judgment of the spring maker, who determines it from his experience and from known standards of metal strength, elasticity, and from effects resultant from tests according to engineering principles.

When a vehicle is driven over a smooth surface

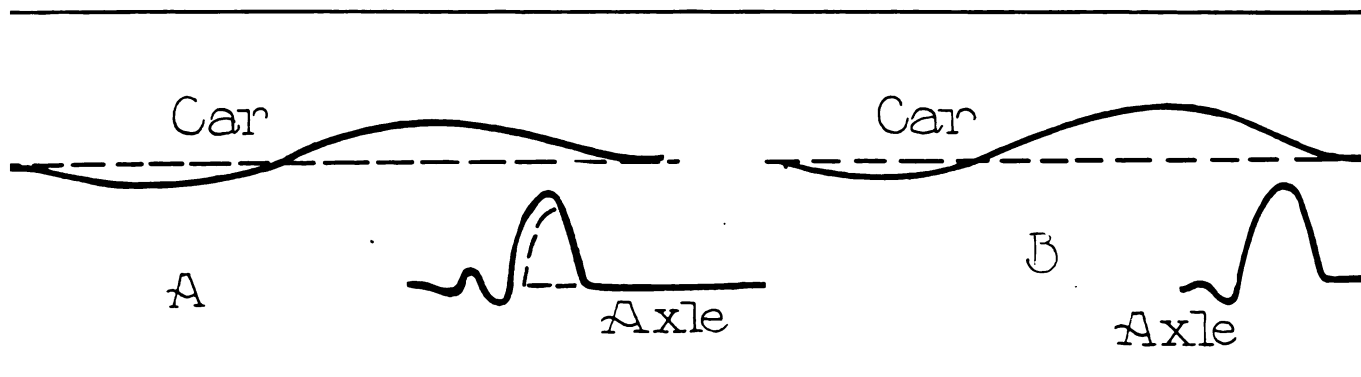


Fig. 1—Showing the Difference Between the Movements of the Axles and Bodies of Vehicle When the Rear Wheels Contact with Road Obstructions.

spring is not variable. The other factors of use vary decidedly.

The suspension of a service vehicle must have provision for carrying the full load, and assumedly at maximum speed over all kinds of street and road surfaces, and the weight supported will range from 10 to 50 per cent. forward and 70 to 90 per cent. rear, generally speaking. The weight of the load carried has the effect of steadying the movement of the body of the springs, and under severe stresses the compression and recoil of the springs are comparatively slow. With the pleasure car long springs are expected to afford a slow movement, but quick action from severe shock may be compensated to some extent by auxiliary springs and shock absorbers. The springs of the service vehicle must be proportionately shorter to sustain the load, and yet have sufficient elasticity to minimize the vibratory effects upon the body and mechanism they support.

the wheel is assumed to have continuous contact with the plane on which it moves, but when any obstacle is met the effect is dependent upon the speed. When starting, if there be a condition that will have the effect of "chocking", the power must lift the weight upon the wheel over the obstruction, and obviously the force must be greater than when moving, for the momentum of the vehicle will contribute materially to the lifting. Starting from idleness the power must actually lift the weight, whatever it may be, and there must be sufficient traction to afford this result.

Considering the front wheels of a vehicle that is driven by power applied at the rear wheels, it will be understood that these are lifted entirely by the momentum, and being free to revolve in either direction the effect when contacting with an obstacle is to stop them, and then they are carried upward by the forward movement. The rolling tendency of the forward wheels is not changed with variations of speed, but

there is a deflection of the springs proportionate to the force of propulsion.

The rear wheels, however, are driven by power, and in theory, at least, these are moving at a stated number of revolutions. When starting there is the necessity of lifting the weight upon these wheels over an obstruction before them, and this must be accomplished by power applied. After starting there is the power of the motor and the momentum in combination. The forward wheels are "pushed" and there is not the resistance to be overcome that is met with by the rear wheels, because with these traction is absolutely necessary to movement, and unless this traction is positive the gravity influence of the weight tends to stop the vehicle. This condition may be observed when a motor vehicle is driven on any surface where traction is not certain, and the wheels revolve without imparting power.

Observation of a "pushed" wheel will show that it will lift more easily over a road obstruction than a traction wheel, for the latter will strike an obstacle

sufficient, the tire leaving the plane of movement a number of times, each upward movement decreasing materially in height. The movement of the axle is taken by the spring and the rise and fall of the frame, body and load (which are to be regarded as a unit) is much slower. This difference between axle and frame motion, illustrating the influence of the spring, is shown at Fig. 1, which gives the results of experiments made by G. H. Baillie, a member of the British Institution of Automobile Engineers, and represents the movement of a vehicle over a curved obstacle that insured very gradual lifting and lowering of the wheel. The sketch at A shows the effect, which might be expected with a machine of ordinary proportions, when lifted above an obstruction two inches high. From this it will be noted that the wheel moves very quickly upward, and that the frame and body lift slowly in comparison. The sketch at B shows the movement of the wheel and body at double the speed as in A, with retardation of the spring movement by friction, so that the rise of the body was more gradual and the fall was

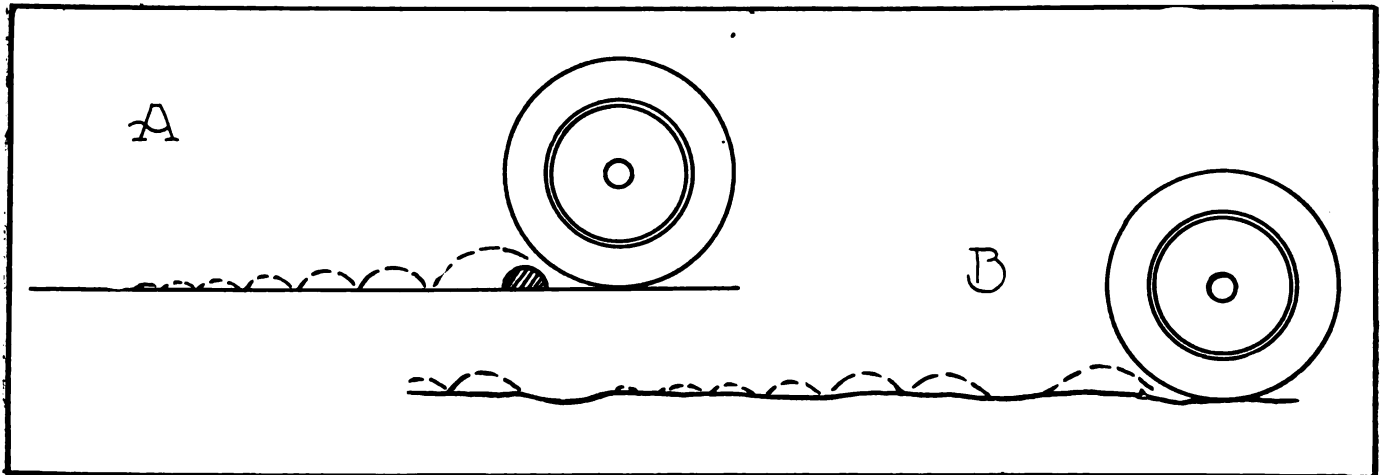


Fig. 2—Illustrating the "Bounding" Movement of a Wheel After Passing Over an Obstacle or an Inequality Existing in the Surface of the Road.

and the combined force of traction and momentum will cause it to "jump", (which word will serve in the absence of a more specific definition) and this will cause a more violent upward movement of the axle, and, of course, reflection that will be proportionate to the deflection of the springs. The movement of the axle has a tendency to compress the spring against the weight it carries, and the frame, body and load are carried upward to a point dependent upon the elasticity or shock absorbing quality of the spring.

The movement of the wheel is somewhat influenced by the resiliency of the tire between it and the road surface, and the shock absorption is dependent upon the type of the shoe, so that the shock imparted to the wheel is not as violent as that sustained by the tire. The tractive effort is continued by the wheel in surmounting the obstacle, and this and the momentum cause the "jump", which carries the wheel usually higher than the obstruction and forward through space until gravity and the reflection of the spring bring the wheel in contact with the surface. There is, however, a bounding effect if the speed be

extended over a longer period. The result was an easier motion of the vehicle.

These two sketches show what may be regarded as the general effect of road shock with and without absorption, although one must understand that this is not representative of the value of any particular device. Neither is there representation of any condition that may be regarded as standard.

In Fig. 2 are shown sketches intended to illustrate the effect of the "jump" of traction wheels caused by obstruction in the path of the wheel or inequality in the surface of the roadway. These differ from those denoted in Fig. 1 in that they are intended to show the movement of the wheels with relation to the plane on which they move, and the "bounding" caused by the resiliency of the tires and the elasticity of the springs. A illustrates the effect of an obstacle on a smooth surface and B shows the result of inequalities in a roadway, in both instances the "bounding" being exaggerated to clearly present the vertical movement.

Any increase of speed necessarily adds to the rise and fall of the axle and proportionately affects the

body and load, and the effect is to deflect the spring until it will lift the frame and the weight it carries, the deflection causing the rise of the axle, and the reaction causing the rise of the body. The initial "ump" is followed by the bounding until the wheel comes to a rest.

Now it is evident that the deflection of a spring is resultant from pressure that straightens the leaves from the ends toward the centre, and as the lengthening from the deflection is not resisted by shackles the greatest movement of the spring is noticeable where the pressure is applied. This is illustrated at Fig. 3, the examples being semi-elliptic types of different length. Obviously the shorter spring as shown at A will be stiffer, and the deflections and reflections will follow each other in more rapid succession than with the longer, as seen at B, it being assumed that conditions other than spring length are alike. The shorter spring is decidedly less sensitive and that protection afforded to the frame and body is not as satisfactory.

But in practice it must be understood that there are three different conditions to be considered, all of

2000-Pound Wagons.			
	Width In.	Length In.	No. Leaves
Front	2.25	40	8
Rear	2.50	48	11
3000-Pound Wagons.			
	Width In.	Length In.	No. Leaves
Front	2.25	42	9
Rear	3	48	10
4000-Pound Wagons.			
	Width In.	Length In.	No. Leaves
Front	2.5	42	10
Rear	3	48	12
5000-Pound Wagons.			
	Width In.	Length In.	No. Leaves
Front	3	44	9
Rear	3	48	14
6000-Pound Trucks.			
	Width In.	Length In.	No. Leaves
Front	3	44	10
Rear	3	48	15
7000 and 8000-Pound Trucks.			
	Width In.	Length In.	No. Leaves
Front	3	44-48	11
Rear	3.5	50	14-16
10,000-Pound Trucks.			
	Width In.	Length In.	No. Leaves
Front	3.5	48	10
Rear	(3.5)	50	17
	(5)	50	12

The minimum arc of springs off the axle is three inches and the maximum is seven inches, this variance

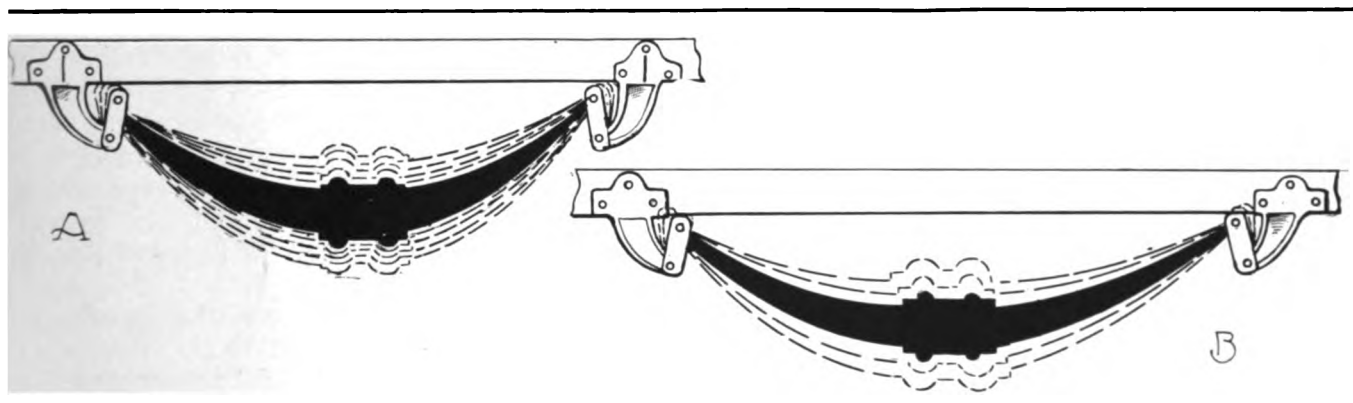


Fig. 2.—Demonstrating the Variance in Deflection and Reflection of Short and Long Springs as Used for Vehicle Suspension.

which are variable, the load, the speed and the road surface. The spring, which must be constant, is expected to have sufficient elasticity to absorb all shocks under all loads, from minimum to maximum. Obviously the spring cannot be uniformly efficient with every condition, and if it is elastic when carrying the maximum load it will necessarily be stiff and slow when but partially loaded. This is practically the condition with motor vehicles that are built to carry weights of several tons. While these will ride easily with a full freight they are so suspended that when given light the vibration is extreme, and for this reason the statement is justly made that greater wear is caused from use unloaded than when used loaded.

In the following statements semi-elliptic springs only are considered, and the sizes of vehicles are those in general service. There are no standards recognized by vehicle builders, but the Perfection Spring Company regards the dimensions stated as fairly good practice:

1000-Pound Wagons.			
	Width In.	Length In.	No. Leaves
Front	2	40	8
Rear	2	46	8-9

depending upon the spring and its use. The supposition is that the maximum arc will apply to the springs of large dimensions. It will be noted that this tabulation gives a difference of 25 per cent. between minimum and maximum length and there is a difference of 75 per cent. in width, the strength being supplied by additional leaves. In the five-ton truck springs the greatest width and fewest number of leaves have been found in the construction of the White machines. This has not, however, been adopted generally.

One of the most interesting facts developed in vehicle spring engineering is that the factor of safety usually allowed is 100 per cent., but the percentage of overload that can be regarded as safe is approximately 30, which can be estimated by the owner or user of any machine. Those who sanction overloading of vehicles can understand that there is a certainty of crystallization and permanent sag developed from the excessive strain upon the fibres of the steel. There is no point where this danger can be anticipated because crystallization may result earlier or later with differing qualities of metals, and sag may be caused by a

single overload, although it is more often resultant from standing with loads, as in a garage when loading is done over night without jacking the body to lessen the static strain. Fatigue is very quickly developed in a front spring and overloading might cause breakage at the centre bolt.

From another source the statement is obtained that the length of front springs for power wagons and trucks should range from 38 to 48 inches and the widths from two to three inches, and the rear springs should be from 48 to 54 inches length and from two to four inches width. This authority maintains that for machines of from 2000 to 6000 pounds capacity the springs should be the same length, but widths ought to increase with the size of the vehicle. The minimum number of leaves is given as six and the maximum number 12, at least to obtain satisfactory proportioning, the only reason for using leaves in excess of the minimum being the need of meeting the capacity and at the same time keep the plates sufficiently thin that the necessary deflection under a moving load will not set up a strain in excess of the elastic limit of the steel.

The claim is made that it is good practise to use a spring three inches width for a three-ton truck, but it is better practise to use 3.5 inches width, because this permits the use of thinner leaves. That further, a 3.5-inch width spring is heavy enough for a five-ton truck, but a four-inch spring is somewhat safer. In connection with this is the statement that should a spring be made as wide as five inches for this size truck the ends of the leaves would probably be too strong for the centre. In fact, the problem of proportionate widths for springs has apparently not been worked out with care, but there is a limit beyond which increase of width is detrimental to efficiency.

With relation to camber or arc, this authority maintains that front springs ought to be as low as possible because of the effect upon steering, five inches being about the limit, but rear springs can be made with a great arc. Underslung springs have the advantage of greater clearance, but the developed length is considerably greater, and the construction, to have the same capacity, must be much heavier. The strength of the spring is proportional to the developed length, modified by the ratio of camber or arc, but the strengthening of the camber does not compensate for the weakness resultant from the greater developed length. The practical elastic limit of tempered carbon steel is set by one well known maker at 130,000 pounds, and from 100,000 to 110,000 pounds stress is regarded as safe practise. The surge is considered to be nearly double the static strain, and with 110,000 pounds as the limit the static strain is kept between 50,000 and 60,000 pounds. By this is meant that when a vehicle is at rest the steel of the springs may be strained safely to 50,000 or 60,000 pounds, and provision is made for practically doubling this in service. This illustrates the enormous strain upon springs in regular service, and why it is that overloading is dangerous, particularly when road surface and speed are

conditions that materially increase the surge or maximum of stress. Attention has been directed to the fatigue that develops in front springs, earlier than in the rear, which may be due to the fact that the driving thrust and steering stresses are through the master leaves and that the strain is not equal because the forward ends are bolted to the spring horns and the rear ends are shackled. The rear springs are shackled at both ends as a rule, the driving thrust being taken by radius rods, the work done being entirely that of supporting the load.

Note may be made that with a 54-inch rear spring, allowing six inches for the seat, there is a length of but two feet either side of the axle, and the entire elasticity must be provided for in the outer ends of these sections. Greater length would insure slower deflection and reflection, but the spring would necessarily be heavier to afford the necessary strength. The flat spring has less arc or clearance and must be mounted so as to permit movement of the axle, generally outside of the frame. This method of suspension insures a lower body and minimizes side sway. Where the springs are underslung the greater length gives maximum elasticity, but the side sway is increased. The supposition is, however, that the more elastic spring is productive of greater tire endurance, and one authority maintains that there will be 50 per cent. more wear in tires that carry long, easy moving springs. Side sway, because of the lateral movement, is severe on tires, and this is a result to be expected with underslung suspension.

It is maintained by the maker that a flexible spring not only saves the tire, but absorbs the vibration that would otherwise be transmitted to every other part of the vehicle, and other conditions being equal, flexibility, as opposed to stiffer construction, would lengthen the life of the machine by 50 per cent. Maximum elasticity is recommended, the limit being excessive side sway and "bumping". But as the load will vary from 10 to 40 per cent. on the forward springs, and from 60 to 90 per cent. on the rear springs, it will be apparent that springs that will be comparatively easy under load may be exceedingly stiff and hard in action when a vehicle is driven unloaded, and the greater the weight carried on the rear axle the heavier must be the springs and the more the vibratory effect when not loaded. The provision made for the "surge" in excess of the static strain amply explains the reason for the stiff spring when the load is heavy.

Spring proportions are determined in practise by first ascertaining what width may be used, and then what weight is to be carried on each front and rear spring. The deflection allowable under normal load is next found by noting the fibre stress of the steel, making allowance for overload and deflection resultant from overloading. Length is somewhat dependent upon the general practise of frame makers, and width by the general practise of axle makers. When the length and width have been fixed the number of leaves and gauge of the steel are determined by the elastic

nit of the metal used. Proportioning is carefully done because of the necessity of making each part of a spring equally strong, so that no section is strained more than another when in use. One maker points out that when the lengths and widths are known care is taken to make the thickness of the plates such that probable depression will not strain the springs over 110,000 pounds fibre stress unless alloy steel is used, in which event a strain of 150,000 pounds is not exceeded. With this factor of safety the plates are made as thick as possible so as to cut down weight. It is claimed by this maker that the thickness of the plates has nothing to do with the ease of the spring, ease being entirely dependent upon the ratio between the weight and capacity; that longer springs are only used because one can get a greater depression without exceeding the elastic limit. The better the steel the thinner the plates the shorter can be the spring.

TAYLOR MOTOR TRUCK TIRES.

The Major Taylor Manufacturing Company has been incorporated in Massachusetts and will locate at Springfield or Worcester. The company has a capital of \$1,000,000. The officers are: President, Fred L. Taylor; vice president, B. Austin Coates; treasurer, J. W. Grady; secretary, Elbert O. Leonard. The company has acquired the rights to manufacture under the Major Taylor patents and purposes to build tires for motor trucks and heavy vehicles. These will be made in sections and are a spring type, a series of 14 sections necessary for a standard wheel. The tires have been extensively experimented with and are stated to give good results. The factory, if the plans of the project are realized, will have capacity of 100 sets of tires daily.

A schedule of the finances of the Stephenson Motor Truck Company, South Milwaukee, Wis., filed in connection with its petition in bankruptcy, shows that the assets are \$6,833, and the liabilities \$15,576.77. The plant has been operated for several months.

Charles Manager O. J. Woodard of the Woods Motor Vehicle Company, Chicago, Ill., retired from that position Jan. 1, and departed for southern California where he will pass several months before taking up business actively.

Irvin J. Adams, for two years connected with the Chicago Tribune, and who was later associated with the United States Motor Company, the Locomotive Company of America, the copy department of the McElwee Advertising Agency at New York City, and with the American Locomotive Company as advertising manager, has joined the Carl M. Green Company, Detroit, Mich., and will handle the advertising for the Chalmers Motor Car Company, Anderson Electric Company, General Motors Truck Company and other concerns.

MERCHANT & EVANS TRACTOR.

Machine Has Capacity of 4-5 Tons and Can Be Adapted for Horse Vehicles.

The Merchant & Evans Company, Philadelphia, Penn., which is one of the best known firms in America dealing in metal and in high class specialties, has placed in the market a tractor of 4-5 tons capacity that may be utilized with special body equipment, or animal vehicles may be converted for service with it. The tractor is designed for heavy haulage and to be as simple and enduring as is possible for the purpose of economizing care and attention.

The construction has combined the motor, clutch, gearset and jackshaft as an assembly on a dead axle, and the arrangement is such that wheels and axle and all the power plant and power transmission system may be turned as a unit 90 degrees, this permitting the turning of the tractor and the body in a circle with nine feet radius. The tractor is compactly built and despite its weight it is turned readily by the steering column, which, being connected with bevel gears, rotates a worm that engages with the circumference of a large worm wheel attached to the forward part of the main frame, which wheel is concentric of the pivot.

From this pivot a steel frame is extended that is mounted on a dead rear axle, the wheels being fitted with steel tires. The body equipment built for regular service with the tractor has a floor of steel or iron plate, sides of the same material, with stakes from which chain is stretched. The tractor unit is furnished when horse vehicles are to be converted for use with it. Truck bodies and rear axles built for horse service can be adapted for all classes of heavy work, the tractor taking the place of the forward wheels, axle, pole and animals. The tractor is mounted on dual rubber tires and is well sprung. The weight required to afford traction is but 30 per cent. of the weight of the machine and load, and only about 15 per cent. of the load is necessary on the tractor to insure all the power that can be desired.

The claim is made by the maker that the tractor will carry five tons without danger of damage and the weight of the outfit when loaded with five tons does not exceed 15,000 pounds. A tractor has been in use for more than six months and during that period has had capacity to do whatever work has been required without fault or failure. The machine was first displayed at the exhibition of road working machines in connection with the good roads convention in Philadelphia last month.

A factory is to be erected by the Homer Motors Company, Los Angeles, Cal., at San Fernando road and Anvia street, for the construction of heavy tractors and light delivery wagons. The plant will produce all parts required for the construction of these vehicles.

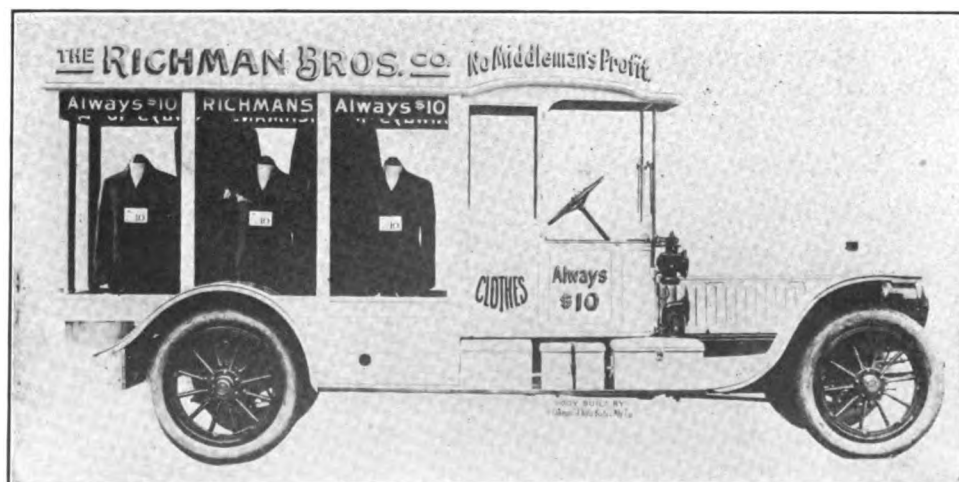
SELLS CLOTHING FROM A MOTOR.**BUYS 50 PEERLESS TRUCKS.****Cleveland, O., Firm Displays Its Goods to Customers in Travelling Showcase.**

A novelty in merchandising is that adopted by Richman Bros. Company, Cleveland, O., engaged in selling men's clothing at retail, which has in service what may be termed a travelling showcase in which are displayed the models of garments sold at different seasons. The firm is well known in Cleveland and vicinity, but it has sought to develop business direct with consumers instead of selling to houses in each locality, and as it manufactures goods, the purpose is to eliminate the profit that is usually taken by the retail merchant.

Doing a mail order business in clothing was found to be a difficult proposition from the fact that the people interested had little knowledge of what they were invited to purchase, other than by catalogue description and illustration, and developing reputation and confidence in competition with local dealers was found to be a slow and unprofitable process.

The company purchased a six-cylinder Peerless chassis and had this fitted with a body that is practically a large showcase, in which on forms are displayed some of the goods that are produced, windows at sides and rear permitting full view of every garment, while the clothing is well protected. The machine was sent out and it has thus far been driven to practically every town and city in northern Ohio, stops being made where the clothing could be conveniently displayed, and a salesman accompanying it talks to those interested.

The machine has attracted attention wherever it has been sent, and business of surprising proportions has been developed in different places with those whom the company expects will become constant customers. The effectiveness of the display has been amply demonstrated, and the purpose of the company is to have another machine with similar body equipment made ready for the spring campaign.



Peerless Car Fitted with a Showcase Body, Used for Display Purposes by a Clothing House of Cleveland, O.

Los Angeles Company Will Abandon Railroad for Direct Highway Shipments.

The opening of the Panama Canal is expected to have a wonderful influence in developing industries and commerce of the Pacific Coast, but the people of southern California are looking forward to especial benefits because of the splendid harbor and terminal facilities at San Pedro, 22 miles distant from Los Angeles, which will undoubtedly make that port one of the most important in California. The shipping from a great section of the United States to Asiatic ports can be done from San Pedro in less time and for smaller cost, and receipts can be received there and distributed with equal facility, while water traffic north from Panama to American and Canadian cities, and vice versa, will undoubtedly call there.

The Motor Truck & Terminal Company of Los Angeles, which is one of the properties of the Perry estate, which also owns the Los Angeles Market Company, has begun preparations for meeting the demands of additional trade, and has bought 50 Peerless trucks of four, five and six-ton capacities, which are to be delivered as quickly as possible. The Los Angeles Market Company has contract to provision all vessels that enter San Pedro harbor, and until now all shipments from Los Angeles were made by railroad. While the distance from city to city is short the cost is comparatively high, and Benjamin Johnson, president of both the market and the trucking companies, believes that there will be a material saving in the use of trucks, eliminating all railroad freights. Besides the freightage the trucking company has contract to distribute to large buyers an average of 20 carloads of fruit and produce that is received daily by the market company, and it is intended to do a general transportation business for Los Angeles business men.

Between Los Angeles and San Pedro the road is well constructed and the machines ought to make fast trips with great regularity, and radiating from Los Angeles to Pasadena, San Bernardino, Monrovia, Redlands, Riverside, Pomona, Santa Ana, Whittier, Long Beach, Santa Monica and Hollywood are 380 miles of fine roads on which motor vehicle traffic ought to be extremely economical. The trucking company will undertake to make general distribution of goods of all kinds that may be received at San Pedro or at the Los Angeles railroad terminal.

The trucking company has purchased the business and equipment of a num-

of small transportation companies and with as the nucleus has inaugurated service will be extended as rapidly as organization can be perfected and the work can be systematized. With the delivery of the 50 Peerless machines the company will have 80 trucks in service, and the cities of the company will be extended in every direction and to such points as conditions shall justify. The Peerless trucks have been ordered fitted with drawbar fitment so that trailers may be used when necessary, the purpose being to use trains of two or three units in the interurban work. The contract requires the delivery of the trucks within 60

The trucks were purchased after a report had been made to Jay Clark, general manager of the trucking company, by engineers who investigated the structural features of the machines and the results accompanied with them in differing conditions of service. The prospect for the future for the company is regarded as very promising, and if the expectations of the resident of the company are realized as many as 100 trucks will be used in haulage between Los Angeles and San Pedro after the volume of commerce passing through the Panama Canal has reached the record.

EDISON BATTERY EXHIBITS.

At the New York and Chicago automobile shows the Edison Storage Battery Company, Orange, N. J., make a very comprehensive display of Edison alkaline-nickel-iron storage batteries for traction, lighting and ignition. Since the last shows the company introduced the A-5 size, with rating of 187.5 ampere-hours, this being intermediary between the A-4 and A-6 sizes, which are rated at 150 and 225 ampere-hours respectively. It is suited for use in 1000-pound delivery wagons, in baggage, freight and industrial work, or where the A-6 size would be larger than was necessary.

Batteries rated at 6.5 volts and 80 ampere-hours, used for ignition and lighting in gasoline vehicles, will be made in steel boxes or wood cases. The electric type of battery affords easy loading and reduces the weight. The Edison batteries are made today practically the same as five years ago, and the same type is used for all purposes, no modification or change being necessary, and the elements are equally suitable in light or heavy traction for lighting plants.

PARCEL POST SERVICE.

Special Body Equipment Necessary to Meet Demands for Vehicle Distribution.

The demands of the public upon the Postoffice Department for the distribution of parcel post packages has enormously increased during the year since this system of delivery was inaugurated, and while the government has purchased but few motor wagons, a large number is used by contractors and rural delivery carriers. The volume of business done by parcel post has grown gradually each week and each month, and during the holiday season that has just ended the number of parcels dispatched was such as to almost overwhelm the facilities of the department, no matter how great provision was made for handling them, and the increase of weight of packages that will be received is expected to very materially add to the volume that will be mailed from now on.

The parcels have been up to the present time comparatively light in weight, although in many instances bulky, necessitating large space in carrying them in vehicles, and great care in handling that they might not be crushed and the contents damaged. Special body equipment is desirable to secure the space necessary, and to afford protection in the event of storms and against loss. An example of a body that is extremely practical is that on a Commerce light delivery wagon now in use in Jacksonville, Fla., for parcel post collection and distribution. This is an express flare-board type, with stanchions supporting a standing roof that is carried forward above the seat to the dash, vertical stay rods strengthening it. Side, rear and front curtains afford protection in the event of storm. The construction is light and enduring, and adapted for handling the freight from the sides and ends. The machine is in constant service and has given entire satisfaction from its practicality and dependability.



Commerce Delivery Wagon Used for City Distribution by the Parcel Post Department of the Jacksonville, Fla., Postoffice.

MOTOR TRUCK "GUN RUNNING".

Daring American Smuggles Arms to Mexican Rebels with a Federal Machine.

An American resident of Arizona, who is the subject of this statement, may not be the only man who has engaged in the hazardous occupation of "gun-running", which is the appellation borne by those who smuggle arms, ammunition, supplies and, in fact, about everything needed by the rebels, across the border into Mexico and turn them over to the rebels—otherwise Constitutionalists. The United States has always frowned upon those who sought to organize filibustering expeditions or engage in attacks or preparations for attack on a recognized foreign government, and severe penalty is always inflicted for violation of the law.

Crossing the border from Arizona one enters the



Federal Motor Truck, Carrying Aeroplane for Use by Mexican Rebels, After Crossing Border, at Agua Prieta, Sonora.

Mexican state of Sonora, and this territory is now in possession of the rebels, but the line is patrolled by United States troops, with absolute authority to make all persons on this side obey instructions. Failure to do so means arrest and abundant trouble. For this reason the "gun-runner" has not only to pass a carefully guarded line, but if he is suspected his movements are constantly under surveillance.

By using a Federal machine this man has not only made trip after trip across the border, but he rushed over an aeroplane that was built by the Glen A. Martin Company of Portland, Ore., that had been sent by train to a station where it was within reach whenever wanted and near to the line. After three months' activities the profits warranted the purchase of a second

machine, and both of these are now used in supplying the rebels the means of carrying on warfare. The statement is made that about 75 per cent. of the ammunition and arms used by the Constitutionalists is shipped on these trucks.

The owner is taking no chances, however, and the governors have been removed from the motors and the machines are equipped with electric lights, so that fast speed can be made at night, when most of the "running" is done. The accompanying illustration was made at Agua Prieta, Sonora, opposite Douglas, Ariz., while the truck and its freight of cased aeroplane was en route to Guaymas, a seaport well down the Gulf of California, but in the State of Sonora.

BIG TRUCK SHOW AT NEWARK.

While there will be no organized exhibition of motor service vehicles in New York this winter, the metropolitan agents will not be denied the business possibilities of display, for those who control New Jersey territory for machines have applied for space at the seventh annual show at Newark, N. J., which will take place at the First Regiment armory in that city the week of Feb. 21. Though the exhibition will be of pleasure cars as well as freight machines, if the desires of the agents for wagons and trucks are met the show will be largely made up of these vehicles. One of the reasons for this is that the Grand Central Palace show will pretty thoroughly demonstrate the passenger cars, and this will be the only opportunity to make a comprehensive display of trucks and wagons. The purpose of the Newark show management is to make the exhibition better than ever before to assure recognition as a state event.

The Breese Motor Plow Company of Wapakoneta, O., recently organized, will begin the production commercially of a tractor especially adapted for farm work, replacing animals for all forms of haulage. The experimental machines have been tested carefully and are regarded as entirely dependable for agricultural service.

The engineering department of the Bessemer Motor Truck Company, Grove City, Penn., is now in charge of R. F. Russell, formerly assistant chief engineer of the American Locomotive Company at Providence, R. I.

The commercial vehicle department of the Motz Tire & Rubber Company, Akron, O., is now in charge of R. O. Brinker, formerly manager of the company's branch at Washington, D. C.

A. L. Longtin, manager of production of the Knox Automobile Company, Springfield, Mass., after 11 years' service, beginning as timekeeper, has resigned. His plans for the future have not been determined.

SIGHTSEEING IN CALIFORNIA.

WILCOX COMPANY EXPANDS.

C¹ Chassis with Special Equipment at Service of Tourists at Pasadena.

Minneapolis Concern Adds \$2,500,000 Capital and Plans for Big Business.

Pasadena, 10 miles distant from Los Angeles, located in the hills and in a region of great fertility, is one of the garden spots of a state noted for its wonderful vegetation and productivity, and a majority of visitors to the southern end of California find its attractions almost irresistible. This city has been made the winter home of people of wealth from all parts of the nation, and these fine estates, as well as the remarkable natural scenery, invite more than usual attention from those who have but little time available. While Pasadena and its environments are beautiful, it would be futile for any person to attempt to see them without assistance, for in whatever direction one goes for miles and miles extend inviting ways and interesting scenes that are all the more interesting when viewed by one who knows of them. For the benefit of the horde of visitors, the Pacific Sightseeing Company was organized and a part of its equipment is a two-ton chassis fitted with a specially built body which will seat 30 persons, there being six transverse

The chassis frame is specially designed and on this body is installed, this being of such width that housings are provided for the rear wheels. On the platform are built the seats, with solid ends and sufficiently spaced to afford ample room. These are large and comfortable, having high backs and cushions. Above the seats, supported on steel stanchions, is a roof. The sides between the dash and the front are enclosed by doors. At either side is a folding glass board, that may be dropped for passengers to get in or leave, which is raised while the machine is running. During storms the body is enclosed by curtains that have large celluloid lights, permitting sufficient light and views by the passengers, but effectively protecting them from the elements.

Regular trips are made, one of which is 40 miles in a circle, and another is a shorter run, which is traversed four to five times daily. During the busy season the machine will average at least 50 passengers and this is often increased by evening runs to special points of interest. The company is in charge of a conductor and a driver, both uniformed. The enterprise is well organized and the machine is a very profitable investment, the operating cost being comparatively small.

The H. E. Wilcox Motor Company has succeeded the H. E. Wilcox Motor Car Company of Minneapolis, has organized with capital of \$3,500,000, and has planned large additions to its manufacturing plant. The H. E. Wilcox Motor Car Company was organized six years ago to produce pleasure cars, but soon service vehicles were built and later on the production was made exclusively of this type. The company developed its market in the Middle West, western and Pacific states, and recently turned to the eastern sections with expectation of materially increasing its distribution. Its authorized capital was \$1,000,000, with \$750,000 common and \$250,000 preferred stock, and those interested were O. P. Briggs, who organized the Twin City Iron Works, which was later absorbed by the Minneapolis Steel & Machinery Company, and who was president for the National Founders' Association, and J. F., H. E. and R. D. Wilcox. The factory has been several times enlarged and the number of employees ranges from 600 to 700.

In the reorganization the above named men have been joined by F. E. Kenaston, president of the Minneapolis Threshing Machine Company; M. J. Scanlon of the Brooks-Scanlon Lumber Company; C. H. Davidson, Jr., of the Davidson-Ross Company; G. W. Lewis of Wilcox Bros. Lumber Company and P. M. Starnes, vice president of the American Timber Holding Company, all well known from their connection with industrial and commercial life of the Northwest. The capital is \$2,000,000 common and \$1,500,000 preferred stock, and the intention is to put from \$500,000 to \$1,000,000 into the business within the next six months. This will be largely used for additions to the plant and for new factory equipment. O. P. Briggs is president of the company, H. E. Wilcox vice president, and the directors include the other names stated.



GMC Chassis and Special Body Equipment, in the Service of the Pacific Sightseeing Company, Pasadena, Cal.

HIGHWAY TRANSPORTATION EXPENSE.

Operating Records of 28 Representative Concerns in Different Cities Show a Saving from 33 to 50 Per Cent. by the Use of Motorized Equipment.

THE cost of transportation practically doubles the value of products of industry when placed in the hands of the users or consumers, this application being made as an average and not with reference to any specific instance, and including every charge from origination to delivery. In one sense this is an accumulation so gradually made that its importance is rarely understood, and only when careful analysis is made is there realization of the enormous burden imposed upon the people. Where an article is of large value the expense of transportation is relatively smaller, and where the cost is comparatively small the ratio is greatly increased. The items of cost may be varied considerably, aside from the charges for transporting, which not only go on forever, but have been increasing because of conditions that have the approval of the people, who, by such approval, justify what must be eventually paid by them.

America is sectional with reference to industrial production, some portions being given over largely to manufacturing, some to agriculture, others to mining, etc., but generally the needs of the people are alike and the products are distributed wherever required. The population is constantly increasing, and consumption keeps pace with this increase. Just so long as the present means of transportation are continued there can be no change unless there be economies worked out by others than the recognized common carriers. There is no doubt that this can be accomplished, but systematic endeavor must be made and whatever the result sought, it must be obtained without loss to those who are now interested in or profiting by any one of the numerous forms of transportation.

Cost by Rail and Water.

Considering the possibilities for a moment, the fact must be borne in mind that during 70 years of railroad development in America the cost of rail freightage has been reduced from 7.66 cents a ton-mile to 7.5 mills, or very close to a tenth of the original cost, yet since 1900 there has been very little change of the average receipts a ton-mile for railroad haulage, according to statistics of the Interstate Commerce Commission, and the prices are slightly more than 13 years ago. Because of these facts there is no reason to hope for relief from the railroads.

Water transportation is materially cheaper than by railroad, as evidenced by available statistics, and shipments from Europe are decidedly less than to Europe, this condition resulting from the cheerful co-operative efforts of the steamship lines, which regulate rates by conference and control the entire Atlantic transportation without the slightest responsibility, so far as jurisdiction of the United States is concerned. The maximum rate will approximate three mills for

ocean lines. Interstate water transportation is decidedly cheaper than by rail, the available statistics showing the rates to vary from .5 mill a ton-mile on the Great Lakes to three mills on canals from five to 10 feet depth.

Factors That Increase Cost.

Regarding these methods even casually it will be noted that these rates must be applied to long hauls and large bulk, and that for smaller shipments the charges are relatively more. But it will be understood that where the distances are of considerable length the cost will increase very rapidly. Considering a manufactured or agricultural product ready for marketing: If there is no railroad siding at the farm or factory the production must be carted to the freight station or to the pier, unloaded and placed in cars or on the vessel. If the shipment is made through by rail or water this is one thing, but there is a possibility that both methods may be used, and in such event this means an intermediate handling. Upon arrival at the destination the freight may be delivered from the car at a siding, but if shipped by vessel there is another cartage, a condition that is met in the absence of spur track facilities. If sent to warehouses delivery may be made to a customer direct, or if shipped there is handling at another terminal and perhaps a second warehouse storage. Or if sent to a store, distribution may be made from there. In fact one could follow a shipment from the producer to the railroad terminal or pier for shipment, through the period of transportation, receiving and handling at the destination, and from wholesaler to retailer and to the consumer. One would necessarily be impressed by the fact that the hauls are exceedingly short and, with the small loads and the time of men and vehicles lost during each stage of the shipment, the cost is very large when distance is considered. Contrast vehicle transportation with rail or water shipments and the rates will be found to be comparatively high. And taking each item one can understand how rapidly the charges for moving multiply.

Hauling Farm Products.

The commercial vehicle committee of the Automobile Chamber of Commerce has given some attention to this phase of the subject and has dealt with facts that are of more than usual interest. In 1906 the Department of Agriculture made a careful investigation of the cost of hauling farm products to shipping points in different sections of the United States, dealing with 23 principal products of farms, plantations and ranches. Nearly 1900 replies were received from correspondents, which were tabulated and analyzed, and from the result the finding was made that the cost was slightly more than 23 cents a ton for every mile hauled

animals and wagons. The average haul was just short of 10 miles, generally over earth or unimproved roads, for that time the percentage of improved roads was a trifle more than eight per cent. From this it will be understood that the average expense of hauling farm products was practically \$2.30 a ton, and this was but the beginning of the charges for transportation. How much more might be added depends entirely upon the market, but this expense might be from three or four times as much in the aggregate, and in the event of long shipments the cost would increase very fast. These products, it will be noted, are not as a rule what might be regarded as valuable and consequently the profit that may be taken is limited. This fact often prevents shipment of freight to points where better prices might be obtained.

Effect of Improved Highways.

The only known manner of reducing haulage cost is by improving the highways, and while seemingly large results have obtained through constant attention for good roads and the expenditure of considerable sums for betterments by towns and states, the percentage of thoroughfares on which the haulage cost is minimized is very small, and whatever gain has been made through improvement has been offset by increased cost of animals, their food and maintenance, labor of drivers and other employees, and other items of expense.

It may be well to note in this connection that whenever price for work is made a rate is established that is paid for all (if the work be done by contract), and not the exact expense to the contractor. And the rate, unless the competition is very keen, is always sufficient to meet a considerable advance. In the cause of the changed conditions there apparently little reason to expect there will be a reduction in haulage cost. As a matter of fact the probability is that there will be an increase rather than a decrease.

Economy with Motors.

There is reason, however, to believe that a substantial reduction of transportation cost can be brought about by the use of motor wagons and trucks. While investigation, such as was conducted by the Department of Agriculture with relation to horse haulage, has been

COST OF HAULAGE AND DELIVERY BY MOTOR AND HORSE DRAWN WAGONS—COMPILED FROM RECORDS OF 28 PROMINENT USERS OF MOTOR TRUCKS AND WAGONS.

Operating Company	Location	Business	Vehicles No. Kind	Basis of Data	Per Day Motor	Per Mile Motor Horse	Per Ton-Mile Motor Horse	Per Package Motor Horse
1 Abraham & Straus.....	Brooklyn, N. Y.	dept. store	24	1 year record	.....	11.88c	.....	3.67c
2 A. Starr Best.....	Chicago, Ill.	clothing	1 gasoline	.....	\$7.25	.....	.....	10.33c
3 Boston Store.....	Chicago, Ill.	dept. store	1 electric	.....	.....	.....	.....	5.6 c
4 Bridgeport Hydraulic Co..	Bridgeport, Conn.	contractor	2 gasoline	.....	.....	25.3 c	9.85c	16.07c
5 Fair, The.....	Chicago, Ill.	dept. store	52	nine and one-half months	\$9.77	.....	.....	.....
6 General Omnibus Co.....	London, Eng.	passengers	2500 gasoline	1½-ton truck, one year record	\$13.22	.....	.....	.....
7 Gimbel Bros.....	New York City	dept. store	14 electric	first three months 1913	.....	12.84c	.....	.....
8 Gimbel Bros.....	New York City	dept. store	18 electric	six months record	.....	10.8 c	.....	.....
9 Gimbel Bros.....	New York City	dept. store	1 gasoline	six months record	.....	7.52c	.....	.....
10 Gimbel Bros.....	New York City	dept. store	1 gasoline	six months record	.....	9.48c	.....	.....
11 Gimbel Bros.....	New York City	dept. store	1 gasoline	one year record	.....	23.12c	.....	.....
12 Golden Rule Store.....	St. Paul, Minn.	dept. store	3 gasoline	one year record	.....	24.51c	.....	.....
13 Henry Hanlein & Son.....	St. Paul, Minn.	cut stone	2 gasoline	.....	\$14.29	.....	15.3 c	3.0 c
14 Igo Express Co.....	St. Paul, Minn.	express	5 gasoline	garage and taxes omitted	\$12.00	.....	6.0 c	10.0 c
15 Indiana Market.....	Chicago, Ill.	meats	1 gasoline	ry. frt. rate 16c ton-mile	\$7.17	\$13.26	.....	.....
16 Michaud Bros.....	St. Paul, Minn.	groceries	6 gasoline	.....	.....	.....	.....	2.5 c
17 McMillan Co., J. T.....	St. Paul, Minn.	pork pckr.	1 gasoline	.....	\$8.32	\$13.27	.....	4.5 c
18 Nawn Co., Hugh.....	Boston, Mass.	contractor	6 gasoline	five months record	\$17.20	37.6 c	.....	.....
19 Perkins Co., H. J.....	Springfield, Mass.	produce	3 gasoline	one year record	\$11.95	\$16.80	.....	.....
20 Rothchild Co., Maurice..	Chicago, Ill.	dept. store	6 gasoline	.....	\$16.20	\$33.00	.....	8.0 c
21 Spaulding & Spaulding..	Buffalo, N. Y.	coal	17 gasoline	eight months record 1 truck	\$9.40	.....	11.3 c	11.0 c
22 Springfield Breweries.....	Springfield, Mass.	.....	1 gasoline	record for 11½ months	.....	27.5 c	.....	.....
23 Standard Oil Co.....	Nashville, Tenn.	oil	1 gasoline	two years experience	.....	.....	32.6 c	8.5 c
24 Standard Oil Co.....	Memphis, Tenn.	oil	1 gasoline	two years experience	.....	.....	7.62c	.....
25 Standard Oil Co.....	Memphis, Tenn.	oil	1 gasoline	two years experience	.....	.....	7.94c	.....
26 Stix, Baer & Fuller.....	St. Louis, Mo.	furniture	10 .....	.....	.....	.....	.....	24.33c
27 Stix, Baer & Fuller.....	St. Louis, Mo.	bulky goods	10 .....	.....	.....	.....	.....	10.5 c
28 Transit House Stores.....	Chicago, Ill.	meats	2 gasoline	.....	\$4.19	\$7.42	.....	14.75c
29 Troy Wagon Works.....	Troy, O.	.....	1 gasoline	16 tests	.....	.....	14.9 c	27.7 c
30 United Dressed Beef Co..	New York City	meats	29 electric	seven years experience	.....	.....	7.89c	17.28c
31 United Dressed Beef Co..	New York City	meats	5 gasoline	seven years experience	.....	.....	8.04c	.....
32 Wouter's laundry.....	Chicago, Ill.	laundry	.....	.....	.....	11.0 c	.....	2.66c
33 Mill corporation.....	.....	hng. coal	.....	.....	.....	41.6 c	8.3 c	.....
34 Retail dealer.....	Eastern City	coal	3 electric	one month record	\$12.00	.....	7.5 c	.....
35 Retail dealer.....	Suburb	coal	.....	.....	\$12.64	.....	13.3 c	.....
36 Wholesale dealer.....	Large City	coal	.....	.....	.....	6.7 c	.....	.....
*Omitted from average.					Av. \$11.06	\$16.75	20.24c	11.23c
					.....	.....	17.76c	7.90c
					.....	.....	.....	15.04c

made to determine the relative efficiency of motor vehicles, a sufficient demonstration has been made in differing service to state without question that the service would be far more economical than with animals. One can bear in mind that the average haul as ascertained by official investigation was not quite 10 miles, and it is evident that this is a sufficient distance to justify the use of motor equipment. Experience has shown that the economies of power trucks and wagons have in some instances exceeded 50 per cent., and that the average will probably approximate a saving of 33 per cent. This statement is reasonably substantiated by a tabulation made by the secretary of the commercial vehicle committee of the Automobile Chamber of Commerce.

This tabulation is made up from detail reports of operation of motor trucks and delivery wagons used by 30 different concerns in different classes of business in 15 cities, these records in some instances being itemized and covering periods of a year or more, in several cases being the operating cost of from five to 15 or more vehicles. These data were analyzed, tabulated, and arranged to show the expense of delivery and haulage by the day, mile, ton-mile and package, these covering practically all the detail that could be authoritatively determined. Where this was possible the cost of horse service has been placed against the figures for motor equipment, and as the figures for animals were obtained from the owners of motor trucks and wagons and relate to experience with both classes of vehicles in the same work, the comparison made is equitable and reliable.

Average Haulage Costs.

From these figures one will see that the average cost of haulage in urban work with motors is 11.25 cents a mile and with horses 17.75 cents a mile, or a difference of about 36 per cent. The average expense of delivery by department stores, furniture dealers, clothiers, grocers, markets and electric light companies is about eight cents a mile by motor vehicle and about 16 cents with horses, a saving of 50 per cent. with the motorized equipment. The average cost of operating motor trucks and wagons, both gasoline and electric, is \$10.97 a day, this including all items of expense, the garage, driver, interest, depreciation, etc. The average cost of doing equivalent work with horses is \$16.75 a day, which includes the expense of from two to three wagons with drivers. This is a difference of about 34 per cent. These figures bear out the statements made above with relation to the economies of motor equipment, and it will be understood that this work is largely what is regarded as short hauls, where the horse is at its best and the motor wagon shows the least productiveness. In long haul work the probability is that the showing would be increased to 50 per cent.

A suggestion of what the general use of motor vehicles would accomplish is made in estimates submitted by the executive of a Chicago transportation company to the Chicago Association of Commerce. The report stated that more than 250,000 tons of freight

are hauled each day through the streets of Chicago by animal team and motor power, and that this represents a cost of approximately \$60,000,000, or about \$25 a year for each resident of the city. In Chicago more than 50,000 horse wagons and about 4000 motor trucks and wagons are in use, and with the reduction of this number to 20,000 by motorizing there would be a direct saving in haulage cost of from \$20,000,000 to \$30,000,000, or from \$8.25 to \$12 a year for each person, or from \$35 to \$50 a year for each family.

This may appear to be an economy so large that it could not be brought about, but viewed from an intimate knowledge of the possibilities one can affirm that this saving could be considerably increased, because of the relief from street and freight station congestion and the expedition of transportation. Besides this there would be the transformation of stables and barns to more productive purposes and the reduction of the expense of street cleaning, to say nothing of the general betterment of the conditions with regard to the health of the community with the elimination of filth and insects and the generally improved sanitation. What these economies and improvements might save is impossible to estimate.

Present Cost of Living.

Viewed from another aspect, a change in highway transportation throughout the nation would materially affect the present cost of living. There were approximately 24,000,000 horses and mules in the country according to the last census figures, and land equal to the combined areas of Ohio, Indiana, Illinois and Iowa was cultivated to raise grain, hay, straw, etc., to feed them. Careful estimates show that about 25 per cent. of the total value of all agricultural products is expended to feed animals used for haulage. The change from animal to motor equipment for highway and agricultural purposes would permit the use of this immense area for the production of food crops, and gasoline, kerosene, alcohol, distillates and even coal could be used for fuel.

The tabulation, while it is comparatively small, and it does not deal with the agricultural phase of transportation, is worthy the study of every business man, for it indicates there are economies that are sufficiently attractive to be brought about. Incidentally the population of the country is increasing at the rate of 2000 daily, and additional food must be produced to meet the general requirements. The subject is deserving the careful attention of all people, for highway transportation means, besides all its economies, relief from monopoly by corporations through careful organization and systematic operation.

The fleet of General Vehicle wagons that was recently placed in the service of Lord & Taylor, which firm has one of the best known department stores in New York City, is fitted with batteries of A-5 Edison alkaline nickel-iron cells, this size being regarded as having ample power for the service required in delivery work.

BOSTON'S FIRE DEPARTMENT EQUIPMENT.

Reasons Which Have Impelled Delay in Acquiring Motor Apparatus---Recommendations of Chief Mullen as to the Immediate Future--Other Municipal News.

ALTHOUGH the Boston fire department began experimentation with self-propelled motor fire apparatus in 1867, its present gasoline driven equipment is not as large as that of many cities which do not approach it in size. There are several reasons for this situation, and that the fire department officials are thoroughly convinced of the practicability of such equipment is evidenced by the fact that request has been made for an appropriation of \$300,000 for the purchase of motorized apparatus during the next two years.

It will be remembered that the heart of Boston's business district was visited by a most disastrous fire, Nov. 9, 1872. For several weeks previous to this fire the horses of the city had been suffering from an izootic, and the department was seriously handicapped as a result. When the alarm was rung in, there were no horses available for fire duty and the apparatus was drawn to the scene of the conflagration by hand. In addition, the water mains in the district affected were fed by pipes of smaller dimensions, and were themselves in poor condition.

Early Experimentation.

Oct. 1, 1867, Boston first turned its attention to self-propelled steam engines. At that time the Amoskeag people of Manchester, N. H., were experimenting with steam fire engines

of this type, and it would appear that this experimentation was continued under an arrangement with the Boston fire department. One of the new engines was brought to that city and placed in the station at East Boston. Oct. 11 of that year it was placed on trial before the board of fire commissioners. New York City, the members of which came to Boston to see the

novation. At that trial it developed a speed of three miles an hour, and later it was able to traverse the crooked streets down town at a speed of four miles.

This was a steam engine of the second class and its weight was 7000 pounds. The propelling machinery consisted of a stout chain worked in slotted grooves,

and the links were fitted upon the main shaft and hub of the rear wheels, smaller chains being attached to the brake and connected with the forward axle. Subsequently, another engine in the Boston fire department was utilized in an experiment with liquid fuel, or what was known at that time as hydrocarbon for steam engines. An effort also was made to use this fuel for propulsion, but without success.

Self-Propelled Steam Engines.

It does not appear what became of the original self-propeller, but it seems certain that it was not present in Boston during the big fire. However, immediately after that fire, the department turned its attention to the problem once more, in an effort to eliminate the possibility of being dependent upon horses under such circumstances. This machine also was made by the Amoskeag concern and was installed very late in 1872 or early in 1873.

At first this was considered a very satisfactory type, and the machine was in every way similar to that delivered to the department in New York City in 1874. Hartford, Conn., purchased one of the Amoskeag self-propelled steam engines in 1876 and has had it in service ever since. The Boston engine remained in service a number of years, but it became unmanageable on Beacon hill one day and rolled down the grade, injuring a citizen's foot.

Subsequently, the self-propelling chains were removed and it was converted into a horse drawn engine. The city now has two self-propelled steam engines, one purchased in 1897 and the other in 1898.

The conditions which were revealed at the time of the big fire made it extremely necessary that every precaution should be taken to prevent their repetition.

It was for this reason that the department early turned its attention to the purchase of a comparatively large number of steam fire engines. The city now has 48 of these, and they represent a large investment. Other factors have entered into the problem, making it ad-



Chief John A. Mullen of the Boston Fire Department, in His Horse Steam Car, and Apparatus at Headquarters in Front of the Station on Bristol Street.

visible to depend very largely upon pumping engines, and it was not deemed wise to invest in gasoline pumping engines until the practicability of these should be determined beyond question. The water supply also has received due attention.

The Boston fire department now has four gasoline driven hook and ladder trucks, two combination chemical engines and hose wagons, one chemical engine and two tenders. One of these is a Knox machine, and the others American-La France. To these vehicles should be added 24 Buick chief's wagons in service or ordered for immediate delivery, and four Velies. The department also has experimented with Ross steam cars, but these have now been abandoned, and should not be included in the list of equipment in service. Chief John A. Mullen is shown in one of these machines in an accompanying illustration.

Recommendations for Immediate Future.

The time has now arrived where it is believed that it is unwise to delay longer the purchase of additional motor driven equipment. Chief Mullen has recommended the purchase of the following: Nine gasoline pumping engines with capacity of not less than 700 gallons a minute, seven of which are to replace horse drawn equipment; one tractor drawn steam engine; three tractors, to replace horses on three steam engines; 10 combination chemical and hose wagons, to replace horse drawn equipment of the same type; one high powered hose wagon; nine chemical engines, to replace horse drawn chemical engines; two 75 to 80-foot extension ladders, to replace horse drawn box trucks; 11 combination ladder trucks, to replace horse drawn trucks; two tractors for hook and ladder trucks, and three tractors, to replace horses on water towers.

Fire Commissioner Charles H. Cole goes one step further, adding a request that the \$15,000 appropriated

Example 1.

Cost of motor driven combination chemical and hose wagon, \$5500—	
Interest, 5% for one year.....	\$275
Repairs	38
Supplies and tires	390
Total.....	\$703

Example 2.

Cost of motor driven combination chemical and hose wagon, \$5500—	
Interest, 5% for one year.....	\$275
Repairs	315
Supplies and tires.....	574
Total.....	\$1164

Example 3.

Cost of hose wagon, harness and two horses, \$1500—	
Interest, 5% for one year.....	\$75
Repairs, harness and wagon, rubber tires.....	100
Hay, grain, shoeing, two horses.....	400
Total.....	\$575

He adds that, of course, this does not take into consideration efficiency, or the fact that the department gains the services of the driver as an addition to the fire fighting corps.

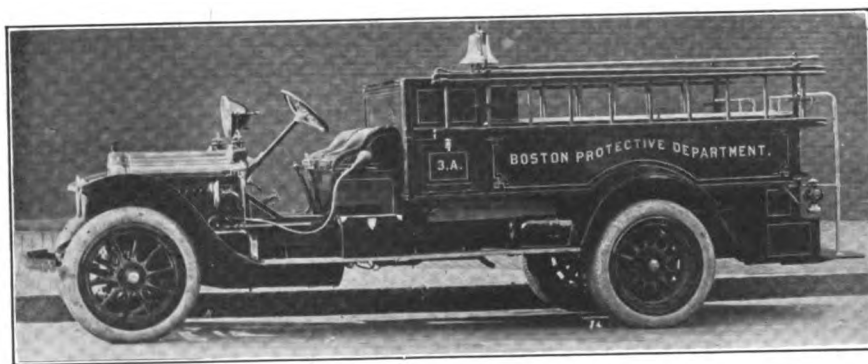
Repair Shop Service.

The Boston fire department maintains its own repair shop, in a special building close to the headquarters station on Bristol street. This is in charge of Eugene M. Byington as superintendent. He has seen long service in the department, dating from the days of the big fire, and is thoroughly familiar with every piece of apparatus owned by the city. Under his direction many of the steam engines have been completely overhauled and rebuilt. When the automobile equipment first made its appearance he took advantage of every opportunity afforded to learn all about motor vehicles in a practical way. In view of the many factory branches in Boston and the large number of expert automobile workmen engaged in the service stations attached thereto, Superintendent Byington was enabled to secure the assistance of men who had had exceedingly practical experience in this work, and the repair shop is well equipped to care for motor driven apparatus.

It will be understood that the foregoing applies solely to the Boston fire department. Other motor apparatus already is installed in towns and cities comprising metropolitan Boston, and the Boston Protective Association, which virtually is a part of the fire fighting force, soon will be completely motorized. This association is financed

by insurance interests and its duties are to protect goods from damage by water and smoke during the progress of a fire.

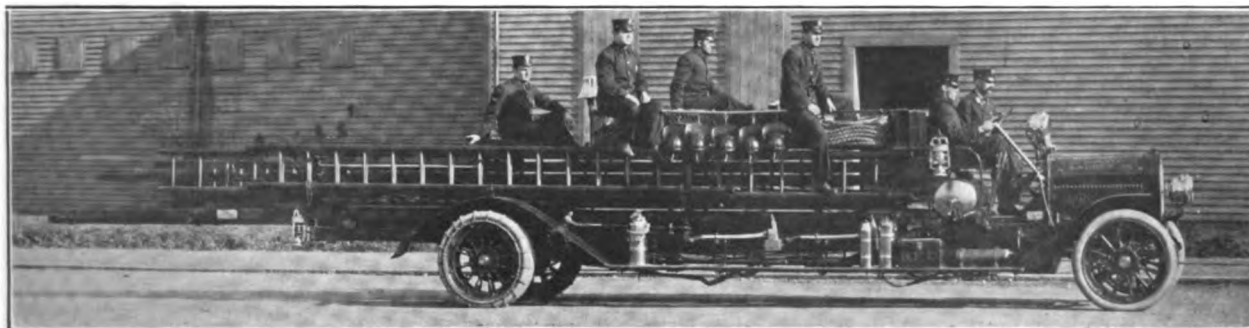
The equipment of Boston Protective Association includes one White wagon and a Knox at the Appleton street station, and two Knox machines on Roxbury street. Superintendent Samuel Abbott, who is in command, also has the use of a White roadster. It is expected that two more wagons will be purchased early this year to replace the horses now at the Purchase street station.



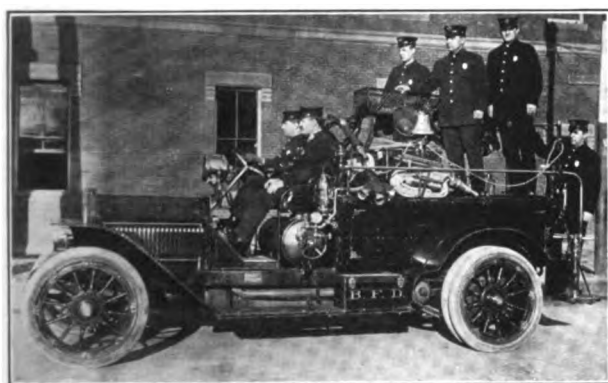
White Wagon Installed with Company 2, Boston Protective Association.

for a new fire station at Parker hill be transferred to the purchase of a motor ladder truck and gasoline pumping engine to cover that section from other houses. This last recommendation, taken in connection with the approval of the chief's somewhat extensive list, is of particular interest, since Commissioner Cole reports that the experience of the Boston fire department does not bear out the figures made public from other cities, with respect to the comparative maintenance cost of the two types. He cites the following instances:

A PORTION OF BOSTON'S GASOLINE FIRE APPARATUS.



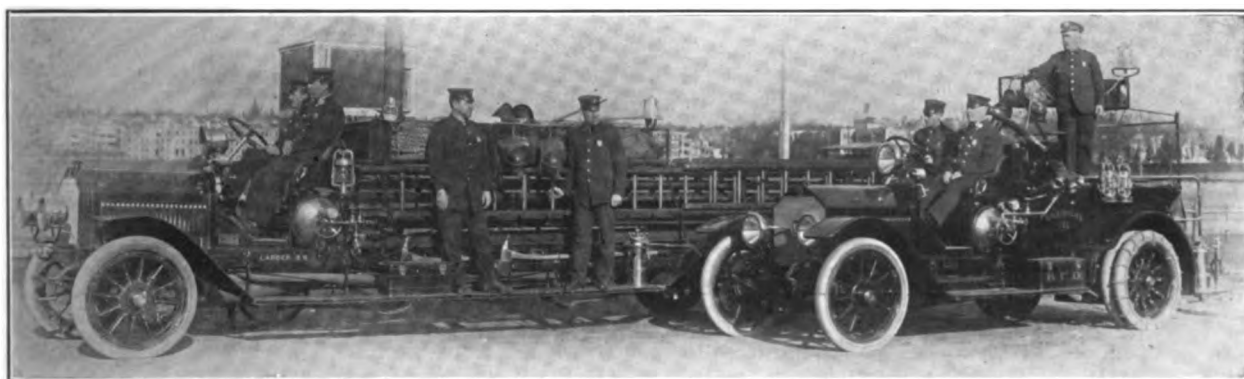
American-La France Hook and Ladder Truck Installed at Oak Square Station, Brighton Section.



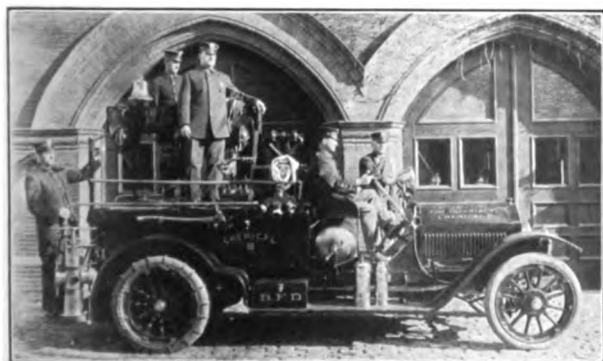
Engine Tender 37, American-La France, Longwood.



Chemical 13, Knox Machine, at Forest Hills Station.



Ladder 29 and Combination Chemical 11, Both American-La France Machines, Located at Lauriat Avenue Station, in the Dorchester District.



Combination Chemical 5 Installed at the Grove Hall Station, Dorchester.



One of the Three Knox Wagons with the Boston Protective Association.

MARTIN FIRE APPARATUS.

Combination Chemical Engine and Hose Wagon Fitted to Type A Chassis.

An accompanying illustration presents the combination chemical engine and hose wagon fitted to the type A chassis made by the Martin Carriage Works, York, Penn. The body work is distinctive in design, and the equipment is such as may be expected to appeal to any city, regardless of size.

The motor is a four-cylinder, four-cycle, water-cooled, vertical unit of the T head type, with bore of 4.75 inches and stroke of 5.5. The cylinders are cast in pairs with valves of ample size for any speed up to 1600 revolutions a minute. The maker's rating is 50 horsepower at 1300 revolutions. Two separate sets of ignition may be used. Lubrication is by force feed.

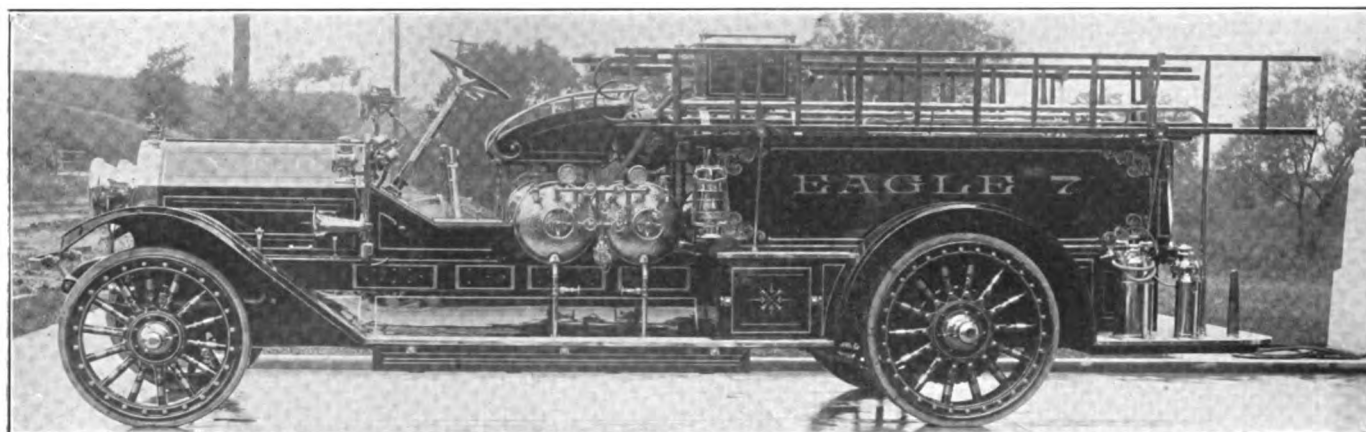
The transmission is a Brown-Lipe of five tons capacity, and is a unit with the Timken jackshaft, equipped throughout with Timken roller bearings. It

initial step toward the abolition of the last horse drawn apparatus in that city. The three machines ordered at that time will be stationed in outlying fire stations.

New Machines in Rochester—The police department in Rochester, N. Y., which has been using electric vehicles since the abolition of police horses, has advertised for bids for a gasoline driven patrol wagon. The fire department is asking for bids for an 85-foot motor driven ladder truck which will be housed in the new fire station now being erected next door to the municipal garage on Exchange street. A runabout also will be purchased for the use of the supervisor of fire engines.

Test Watrous Engine—The fire department officials in Bridgeport, Conn., have approved the new Watrous pumping engine, which demonstrated its ability to lift 800 gallons of water a minute to a height of 29 feet at the official tests held recently.

In the Market—The following cities are considering the purchase of motor driven fire fighting appa-



Combination Chemical Engine and Hose Wagon Fitted to Type A Chassis by Martin Carriage Works.

affords three forward speeds and reverse. Both axles are of the Timken manufacture. Springs are semi-elliptic all around. Final drive is by roller chains. Tires are 36 by four inches in front and 40 by 3.5, dual, in the rear. The wheelbase is approximately 145 inches and the tread 58 in front and 63 in the rear.

The equipment includes two 35-gallon chemical tanks, 200 feet of chemical hose, 1000 feet of 2.5-inch double jacket rubber lined fire hose, 20-foot rapid rope hoist extension ladder, 12-foot roof ladder with patent folding hooks, two hand extinguishers, lanterns, hose basket, etc.

NEWS FROM VARIOUS CITIES.

Five Police Patrols—The police commission of Providence, R. I., has been authorized to purchase five motor patrol wagons. The city already has two gasoline patrols in service.

Last Horse Replaced—With the opening of bids Dec. 15, the fire department in Pueblo, Col., took the

ratus: Bowling Green, Ky.; Great Falls, Mont.; Ontario, Cal.; Babylon, N. Y.; Winnipeg, Man.; Wheeling, W. Va.; Hastings, Neb.; Napa, Cal.; Rome, Ga.; Aurora, Ill.; Whittier, Cal.; Key West, Fla.; Davenport, Ia.; Washington, D. C.; Fowler, Cal.; Petaluma, Cal.; Canandaigua, N. Y.; Neligh, Neb.; San Jose, Cal.; Livingston, Mont.

Find Conditions Improved—After a reinspection of the city departments in Hackensack, N. J., engineers of the National Board of Fire Underwriters have made public the following findings with respect to the fire department:

The advantages to be derived through automobile apparatus manned by full paid firemen are being fully demonstrated in Hackensack. The number of fires extinguished by chemical streams has been practically doubled, with a consequent reduction in the loss per fire; an increase in the number of full paid firemen would result in greater efficiency and eventually make the fire protection commensurate with the size of the municipality. The improvements in organization and equipment made since the previous inspection constitute a good beginning towards carrying out the recommendations and have increased the efficiency of the department; the results merit a further increase in the full paid force and the addition of automobile apparatus along the lines of the recommendations of the previous report.

LONDON'S GASOLINE-ELECTRIC OMNIBUSES.

Brief Description of Tilling-Stevens Chassis Operated by Thomas Tilling, Ltd.—Methods Employed in Providing Care and Maintenance—Cost Analysis.

By R. Douglas-Vickers.

THE great development which has attended the operation of motor omnibuses in England has brought to the front a very interesting type of vehicle

signed so that any increase in the demand for current when the engine is fully loaded is accompanied by a corresponding reduction in voltage.

The output in kilowatts at any speed is proportional to the power exerted by the engine, but the volts and amperes may vary over a large range according to the gradient, speed, or degree of acceleration required. The amperes required by the series wound motor are nearly proportional to the voltages of supply. It thus follows that when the vehicle is running on the level road the demand for amperes will be small, but on gradients it will considerably increase, with a corresponding decrease in voltage, resulting in a slower speed with increased torque; this change takes place automatically.

On level roads and ordinary gradients the whole of the control is effected by the gas throttle pedal operated by the right foot of the driver. On stiff gradients the shunt resistance has to be employed to allow of increased engine speed. The controller has three positions, forward, neutral and reverse, the whole of the speed regulation being effected with the one position of the controller. As the generator ceases to excite at 300 revolutions a minute of the engine, it is not necessary to break the circuit between the dynamo and the motor on stopping in traffic, as by the release of the throttle pedal and the consequent slowing down of the engine no power is transmitted to the cardan shaft.

In other respects the Tilling-Stevens chassis more or less corresponds to the usual type met with.

A large number of motor omnibuses of this type are now in service, both in the United Kingdom and elsewhere, but I only propose referring to the fleet



Type of Tilling-Stevens Omnibus in London Service.

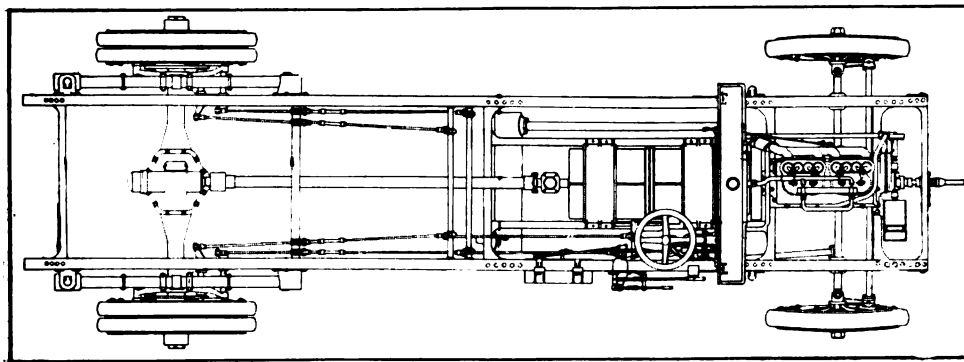
of the Tilling-Stevens, and some notes regarding it will serve to preface a short account of its work under service conditions.

The great feature in the design of the chassis is the elimination of the usual clutch and gearbox and the substitution therefor of a flexible electrical transmission between the gasoline engine and the driving wheels, which gives, among other things, remarkably easy starting and control, and silent running. The final drive in this vehicle is from an electric motor through a cardan shaft to the worm gear on the back axle. The electrical supply for the motor instead of being provided by a battery, as in the ordinary electric vehicle, is supplied by a specially constructed dynamo coupled directly to the four-cylinder gasoline engine, which is the main source of power.

The electrical portion of the mechanism consists, therefore, of the generator, a series wound electric motor, and the controller box, the last mentioned carrying a reversing switch and a shunt resistance for the generator fields. The generator, which is capable of an output of from one to 20 kilowatts at speeds varying from 350 to 1400 revolutions a minute at a voltage varying from 0 to 300, has been de-



Tilling-Stevens Omnibus Chassis with Body Removed, Showing Gasoline Motor.



Plan View of Tilling-Stevens Chassis, Indicating Location of Electric Dynamo.

operated in London by Thomas Tilling, Ltd. By the end of the present year (1913) this concern will have about 175 machines at work in London.

In order to keep the vehicles in continuous and efficient running order the following garage methods are adopted: Each omnibus is retained in the garage every 14th day and thoroughly inspected; that is, the valves are ground in and adjusted, the magneto carefully examined, the brakes adjusted and renewed. The electrical equipment is also examined and cleaned. Every eighth inspection day the differential, including the worm and worm wheel, is taken out of the back axle and thoroughly examined for any wear that may have taken place, this work being done in addition to that already mentioned. No work is done at night beyond ordinary brake adjustments, with the exception of the daily washing, cleaning and greasing. At the end of a year's working each vehicle is taken to the company's chief garage and the chassis thoroughly overhauled, the body being taken to the coach building department, where it is overhauled and repainted.

Referring back to the fortnightly inspection: The "Driver's Report and Shed Day Sheet", relating to the omnibus garaged, is taken out of the binding case and attached to the machine, the points mentioned thereon are ticked off as the examination is proceeded with, the omnibus being finally tested by the garage superintendent, who signs the sheet before the vehicle leaves the garage.

Naturally, a very complete record of all expenses is kept in connection with the operation of this fleet of omnibuses, and I am able to give the proportion for

each item a mile travelled.

It might be mentioned in conclusion that each of these omnibuses covers upwards of 120 miles a day, and that lost time through mechanical stoppages is practically an unknown quantity. What it costs to produce a model London type of motor omnibus is not generally known, but it is in the immediate vicinity of \$960, which admits of easy

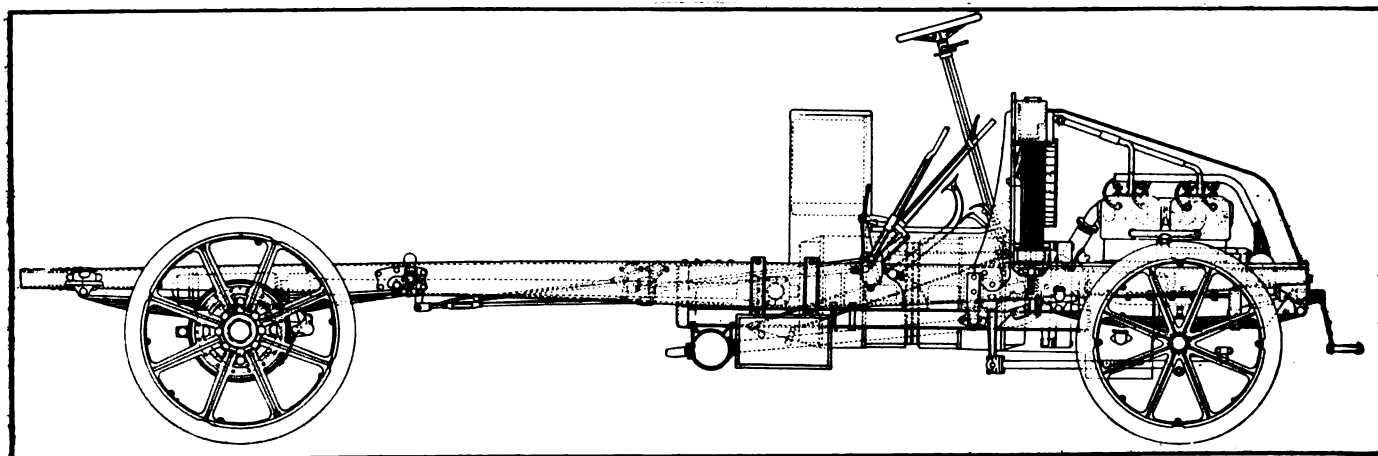
amortizement in five or six years.

In addition to this information concerning the Tilling-Stevens chassis, supplied by Mr. Douglas-Vickers, it may be stated that the gasoline engine has four cylinders, with bore of 105 mm and stroke of 125 mm (4.13 by 4.82 inches), giving a rating of 27.25 horsepower under the R. A. C. formula, which is the same as that of the S. A. E. in this country. The cylinders are cast in pairs. Cooling is by water, and further assisted by a disc fan carried on the rear end of the dynamo shaft, the motor and dynamo being of the semi-enclosed type. This shaft, as well as the motor shaft, is mounted on ball bearings. Lubrication of the motor is by a splash system. Ignition is by Bosch high-tension magneto, and the carburetor is a Solex.

EXPENSES FOR TILLING-STEVENS 'BUSES.

	Cents a Mile		Cents a Mile
Running	1.736	Depreciation, rent rates	1.698
Maintenance .....	.480	and taxes .....	.302
Tires	2.196	Trade vehicles	1.694
Gasoline	2.134	Conducting .....	.470
Lubricating oil .....	.156	Body upkeep .....	.540
Driving	2.502	Traffic expenditure .....	.002
Grease .....	.036	Men's uniform	
Kerosene .....	.042		
Lighting .....	.138	Total	14.126

As stated above, a prominent feature of the design is the mounting of the dynamo, which is connected direct to the engine by means of a flat leaf spring coupling, no friction clutch being used. The control is effected entirely by the gas throttle pedal, except when ascending very steep hills, in which case a shunt resistance contained in the controller box is used, allowing increased engine speed.



Side Elevation of Tilling-Stevens Chassis, Presenting Arrangement of Components and Their Relation to Each Other.

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New Commercial Car Accessories

Kellogg Engine Primer.

The Kellogg Manufacturing Company, Rochester, N. Y., is making a new form of engine primer which presents novel features, in that the device is mounted on the driver's side of the dash and the container or vessel is of the self-filling type. The fluid receptacle is of glass and is fitted with two knurled nuts or valves, the upper being employed to fill the vessel while the other controls the flow of the priming fluid to the motor. The fuel supply is obtained by turning the top knurled member to the left, the gasoline being forced from the tank to the glass member by the vacuum created by the suction stroke of the piston of the cylinder. It will be noted that two small pipes are attached to the dash vessel, and these are run from each arm of the intake manifold, thence directly over the intake valves of the cylinders. Operating the lower knurled nut permits the fuel to flow over the valves and at the same time the fluid is mixed with the incoming air drawn in through the carburetor when the motor is cranked. This assures a rich mixture for starting and one of the qualities of the primer is that the flow may be so controlled as to provide a slightly rich mixture until the engine is warm enough to operate on the normal mixture. The company also manufactures a model for pressure feed fuel systems.

Brown, Jr., Tire Pump.

The Brown Company, Syracuse, N. Y., maker of the Brown power tire pump, has brought out a new design termed the Brown, Jr., which is moderately priced and designed for light vehicles. It is identical in all respects, save the size and length of hose, and is not equipped with a gauge. The pump operates on the compound principle, inflating the tire with pure, cool, fresh air, and it is stated that a shoe can be pumped up to a pressure of 60 pounds in a few minutes, or to 150 if desired. The cylinders are of gray iron, bored and reamed on special machines, and the finish is two coats of gray enamel. The same high grade material and workmanship characteristic of the product of the concern are incorporated in the new design. For \$1.50 extra the company will supply its Q. D. spark plug and special attachments, including a pump connection.

Sure Start Electric Vaporizer.

The United Motor Equipment Company, Chicago, is marketing, through its sales agent, W. E. & J. H. Dodson, the Sure Start electric vaporizer, which is a compact device weighing 10 ounces, and which increases the temperature of the fuel by the use of electricity. It is attached in proximity to the intake manifold, this being tapped to connect a tube conveying the vapor, which is drawn into the cylinders in the usual manner. A small switch is mounted on the dash and controls both the supply of fuel and the electricity which is taken from a six-volt battery. The maker states that it requires but a few seconds for the current to increase the temperature of the fuel to a point making for rapid vaporization.

E-Z Rim.

The E-Z Rim Company, 146 Summer street, Boston, is marketing the E-Z rim, which the maker states can be applied to any automobile wheel using pneumatic tires, without alterations and at a moderate cost. It provides the advantages and conveniences of the quick detachable rim, and, as will be noted

by the accompanying illustration, the use of split rings, cams, levers, etc., is eliminated. The E-Z comprises a removable ring to which lugs are fitted, these retaining it to the rim proper by means of bolts. The method of retention is similar to that employed with demountable types, six nuts and bolts anchoring the ring to the felloe. One of the qualities of the E-Z is that no tool, other than a brace wrench supplied with each equipment, is necessary to remove and replace a tire. With the E-Z the clincher type of shoe may be utilized until worn out and replaced by quick detachable, a universal arrangement. The company manufactures a rim for the model T Ford commercial car, which is fitted with clincher rims.

Dover Breech Lock Oiler.

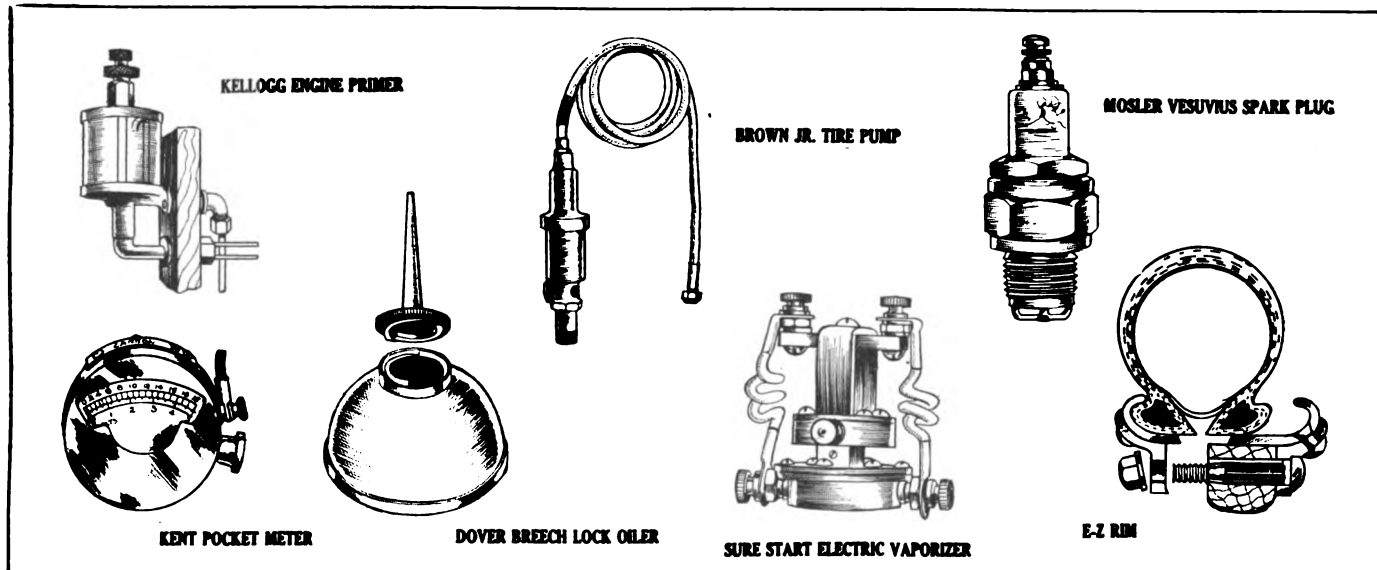
The Dover Stamping & Manufacturing Company, Cambridge, Mass., is offering to the trade the Dover wide mouth breech lock oiler, a new design, which makes for convenience in that the spout may be easily and quickly removed by a rotating movement. This permits of replenishing the supply of fluid without spilling, as the opening is ample in size. The oiler is practically a one-piece construction, the bottom being of the best clock spring steel, pressed against the shoulder of the dome, and the seam is double turned. The spout and breech are put together in the same manner. No cement, solder or brazing is used in the construction. The oiler is made of the best cold rolled steel, brightly polished, plated and lacquered, and is designed to withstand severe use. It is made in 10 sizes, Nos. 12 to 15, these having capacities from three ounces to one pint.

Kent Pocket Meter.

The Atwater Kent Manufacturing Works, Philadelphia, is marketing the Kent pocket meter, which is an automatic volt-ammeter for ascertaining the condition of dry cells and storage batteries. The instrument may be utilized for testing the amperage and voltage, and the readings are accurate, as the needle is delicately pivoted. One of the qualities of the instrument is that no change is made in the connection to the battery for reading voltage and amperage, as the latter is obtained by pressing a button. A flexible lead of ample length is provided with each meter, which is of the dead beat type, insuring accuracy. The Kent comes in a neat, hand sewed leather case and is calibrated for both volts and amperes. Another of its features is the use of a substitute for glass, the maker stating that it is unbreakable.

Mosler Vesuvius Spark Plug.

A. R. Mosler & Co., Mount Vernon, N. Y., well known to the industry as the maker of the Spitfire spark plugs, is marketing the Vesuvius plug, which is designed to withstand severe service. The centre core is of a special stone, practically indestructible, and one of its qualities is that it is so shaped and constructed as to be absolutely gas tight. Another feature is that the plug may be readily disassembled and the parts replaced without interfering with the original adjustments of the points. The last named are of genuine platinum, liberal in size, making for efficiency and durability. The Vesuvius plug is made to fit any motor and is manufactured with various threads, etc. The same high grade material and workmanship for which the product of A. R. Mosler & Co. is noted, are incorporated in the new design. The company issues a booklet on spark plugs which will be mailed free on request.



Illustrating Some of the More Recent Accessories Designed for the Commercial Vehicle, Repair Shop and Service Station.

THE A B C OF MOTOR TRUCK IGNITION.

Part XVII---The Construction and Operation of the Types of Bosch Magnetos Having Double-Wound Armatures---Features of Independent, Dual and Duplex Systems---Single and Dual Contact Breakers---Wiring Diagrams.

By C. P. Shattuck.

BOSCH magnetos are well and favorably known, both in this country and abroad, being standard equipment with a large number of makes of commercial vehicles, and

constructed for service with single and multi-cylinder motors. The various forms are classified by letters and numbers, the letter designating the type of model, while the figure usually represents the number of cylinders. For example: Types D3, D4 and D6 are constructed for service with three, four and six-cylinder motors.



Fig. 94—Bosch ZR4 High-Tension Magneto, Which Is an Enclosed Construction.

With the exception of the number of metal segments the distributor plate, ratio of drive, etc., the principle of the various types is the same. The mechanical details, however, vary slightly.

Various Types Defined.

The terms utilized by the commercial car manufacturer in defining the ignition system employed with his product are often confusing to the novice. The expression high-tension is universally used because with a few exceptions the jump spark has replaced the make and break. Technically, the writer holds that the term high-tension cannot be applied to a magneto generating a low-tension current and using an induction coil for transforming the electricity into a high-tension current, a contention borne out by at least one maker who defines his product as a low-tension magneto employing a coil to convert the current to a high-tension. Distinction is often made between the low and high-tension types by referring to a magneto with a single wound armature as a high-tension, and that with a double winding (primary and secondary) as a true high-tension.

Dual Systems.

Many persons do not understand the meaning of the term dual in connection with the ignition system of a motor. It is generally employed to convey the impression that two sources of current are available, and when utilized in such manner is correct. For the purpose of simplifying the application of the term in

this discussion, it will be referred to as dual and true dual. The latter is an ignition system, including two separate and distinct units, such as a set of dry cells or battery, timer or commutator and induction coil, providing a high-tension current to one set of spark plugs, and a magneto supplying electricity to another set of plugs. This arrangement provides two independent systems, either one of which may be utilized and not be affected by the failure of the other.

Dual Contact Breakers.

The dual system comprises a magneto, the circuit breaker and distributor of which are employed to break and distribute the battery current. With this system the primary current is transformed as previously explained. Generally the circuit breaker of the magneto is employed for interrupting both the primary current of the instrument and that from the battery, although some makers provide a separate contact breaking mechanism in the magneto, a construction that is held to obtain two independent forms of ignition.

Operation of Bosch Magnetos.

The Bosch magnetos discussed herein are all of the true high-tension type; that is, the armature carries a double winding, as will be noted by reference to Figs. 97 and 100. The D4 magneto shown at Fig. 102 is also a true high-tension instrument. At Fig. 98 is presented a diagram of the principal parts of the Bosch D4, and a little study should enable the reader to un-

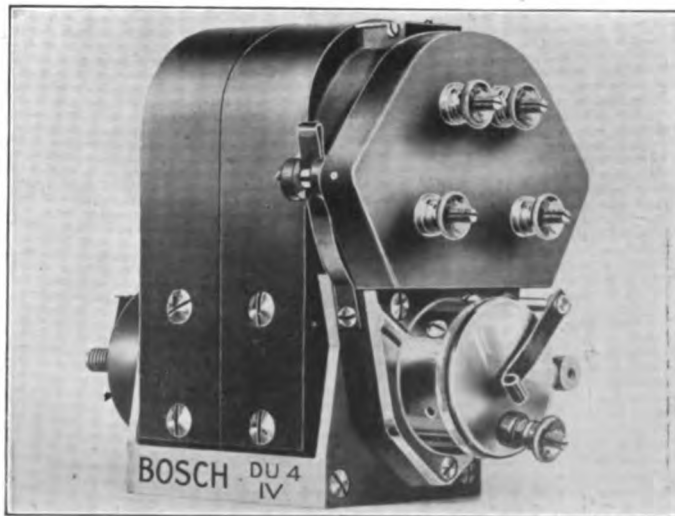


Fig. 95—Bosch DU4, Independent Type with Variable Advance, and Constructed for Multi-Cylinder Motors.

derstand the mode of operation. The principles involved can be applied to other types made by the company. To simplify matters, especially the wiring, the armature is shown separately. It should be borne

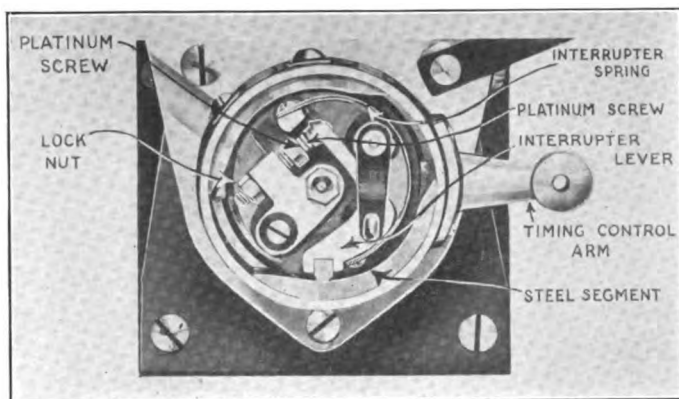


Fig. 96—Contact Breaker Mechanism of Bosch DU4 Independent Type Magneto.

in mind that the current produced in the armature winding is obtained twice each revolution, or at intervals of 180 degrees rotation. This provides a spark each half-revolution of the armature of a four-cylinder instrument.

Path of Current.

The armature is of the shuttle type and has two windings. The primary or coarse windings are indicated by the lines C 1, while the secondary or fine wires, of which there are many more in proportion to the others, are designated by C 2. One end of the primary wire is connected to and is grounded to the armature core, and the other end passes to the insulated part of the interrupter. With this construction the separation of the contact points is obtained by the cams of the interrupter mechanism, which is attached to the armature shaft and revolves with it. The interrupter lever, so-called, is pivotally mounted, and carries a platinum point which normally is in contact with a fixed platinum point. These are designated in the drawing as g 3 and g 2 respectively. The last named is adjustable, so that the distance between the

points may be varied to obtain the break or interruption of the primary current when the greatest number of lines of force are being cut. Or, in other words, when the greatest amount of current is being obtained.

Flow of Primary Current.

Normally, the platinum points are in contact, and when together the primary circuit is closed. Upon the armature shaft being rotated the contact is broken by the lever coming in contact with the fibre rollers, which are shown at C, Fig. 102.

The arrangement of having a revolving contact breaker mechanism and stationary cams permits of the conducting of the current from the primary coil to the interrupter by a direct connection, eliminating brushes that would otherwise be necessary.

When the platinum points are together, the currents generated in the winding have practically no effect on the secondary coil, because the primary winding is short circuited upon itself, flowing through the conductor "f" to the insulated member and thence back to ground through the grounded contact lever.

Secondary Current.

The arrangement of the secondary winding is also outlined at Fig. 98. One end is secured to the live end of the primary, where it joins the conductor leading to the insulated contact point g 2, while the other is coupled to the collecting ring carried by the insulator at the driving end of the armature. A carbon brush collects the high-tension current, and by means of the conductor "1" is delivered to the revolving brush of the distributor n l.

Proper Time of Break.

When the contact points are together, providing as they do a short circuit for the feeble currents induced in the primary, there will be no production of high value current in the other winding. This contact is maintained until the armature attains a position

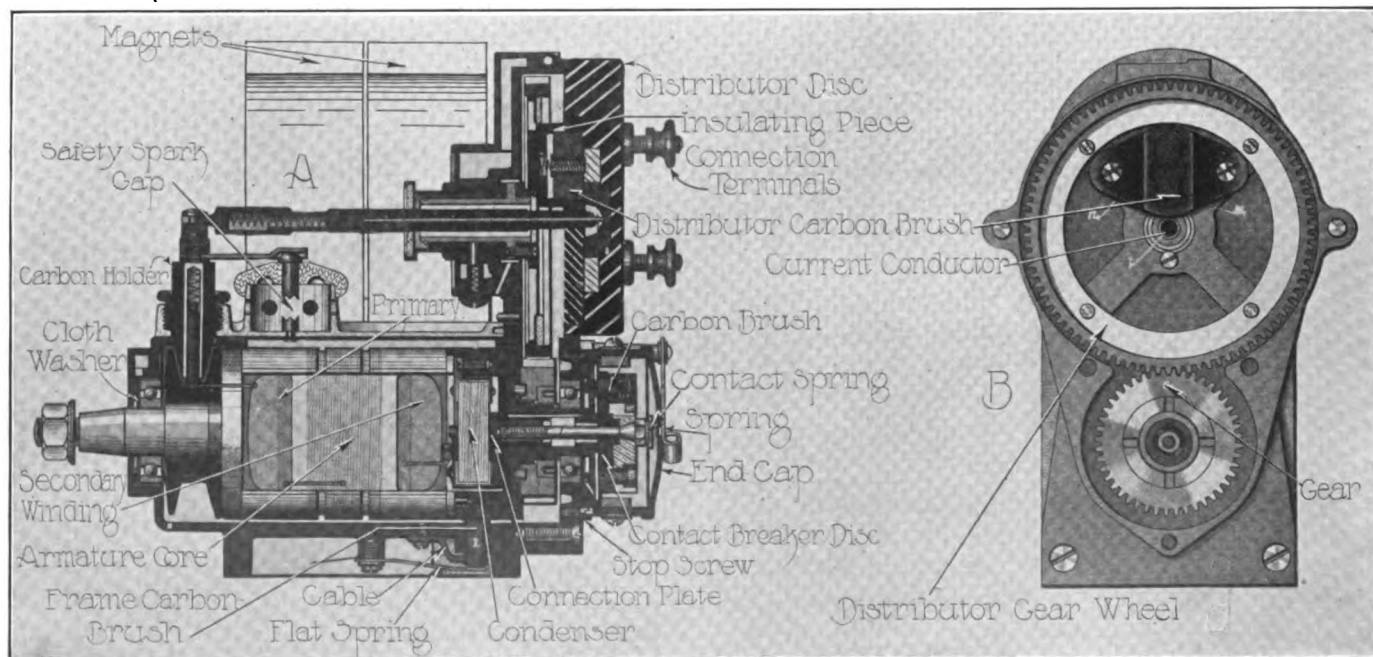


Fig. 97—Sectional View of Bosch DU4 Magneto: A, Depicting the General Arrangement of the Components; B, Distributor End of the Instrument.

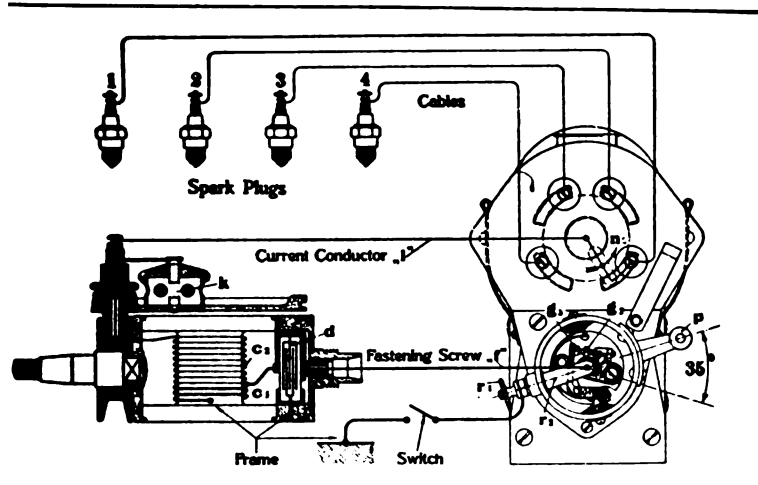


Fig. 96—Diagram of Principal Parts of Bosch DU4 Magneto, Showing Mode of Operation and Principle Involved.

where the current reaches its maximum value, when the contact points are separated, breaking the short circuit that existed during the contact period.

The secondary circuit has been open during this time, or during that period when the distributor arm is moving from one contact to another, and there has been no flow of energy through the secondary winding. While the energy of the secondary is augmented, a spark will not occur at the spark plug until the contact points of the breaker mechanism separate. This is usually true if the distributing brush is in contact with a segment of the distributor. From the above may be deduced that a spark of sufficient value to ignite the mixture cannot be obtained unless two conditions exist. First, the armature must be in a position insuring maximum current production; second, the contact points must separate when the secondary current has attained sufficient value to overcome the resistance of the air gap between the plug electrodes. The function of the safety spark gap, distributor, condenser, etc., has been previously outlined.

Bosch DU4 Contact Breaker.

A variation in the design of contact breakers is illustrated in the construction presented at Fig. 96, which illustrates the components of the type used with the Bosch DU4 magneto. The mechanism is attached to the armature shaft and revolves with it, but differs from the type above described

in that the interrupter lever makes contact with two steel segments secured to or practically integral with the interrupter housing.

The interrupter lever is rotatably mounted and its platinum screw is in contact with a similar or fixed member. Upon the armature shaft revolving, the fibre block comes in contact with the steel segments, depressing the interrupter lever and consequently

separating or breaking apart the platinum contact parts. The housing of this design, which is termed the independent type of magneto, may be rotated, providing a timing range of 35 degrees. For example: With the timing control arm in a fully retarded position, it could be so moved as to obtain an earlier break or separation of the contact points. This is obtained by rotating the housing in a direction opposite to that in which the armature shaft is revolving, causing the fibre block to make contact earlier with the steel segments.

DU4 Independent Type.

The Bosch DU4 independent type magneto, is a true high-tension instrument, and a longitudinal sectional view is shown at Fig. 97 A, with the principal components lettered. The grounded end of the primary winding is connected to the armature core, and the other, or live end, to a brass or connection plate. A screw extends through this plate and serves both to retain it and to conduct the primary current to the contact block. Both the screw and this block are insulated from the interrupter disc, which is in metallic connection with the armature core. The operation of the circuit breaker mechanism has been explained.

The grounded end of the secondary winding is connected to the live end of the primary, and the other end of the secondary is led to a collector or slip ring. Contacting with the collector ring is a carbon brush, retained by a holder. The high-tension current is conducted to a terminal piece, thence through a conducting bar to the central distributor contact. Thence its path is to the distributor carbon brush, which rotates with the distributor gear. Fig. 97 B shows the distributor gear, carbon brush and current conductor, also the proportions of the driving and driven gear, that of the armature and distributor respectively. It will be noted that the driven gear makes one revolution to two of the smaller member, and with the four-cycle, four-cylinder motor, it rotates at the same speed as the camshaft. The driving gear and armature shaft rotate at crankshaft speed. With the DU4 type of magneto the wiring plan is the same as with all true

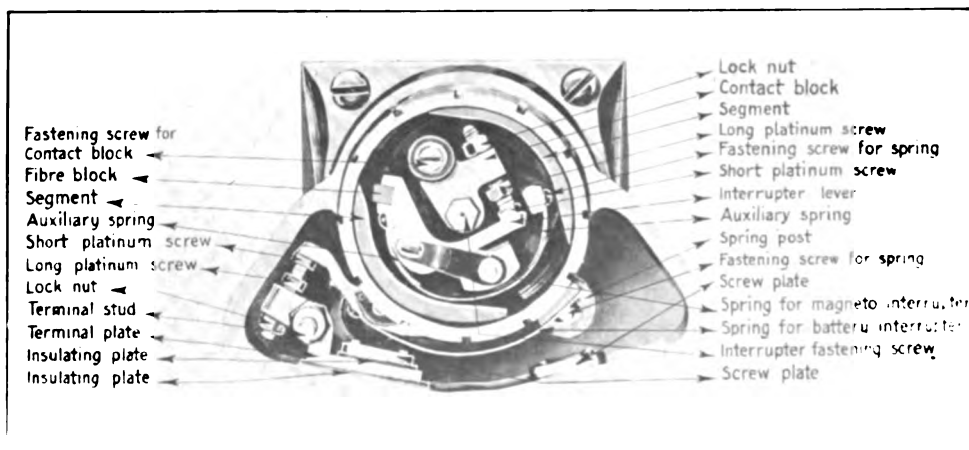


Fig. 99—Dual Contact Breaker of Bosch ZR4 Magneto with Components Lettered.

high-tension instruments. The method of grounding the primary current for stopping the operation of the motor, has been fully explained.

ZU4 and ZR4 Magnetos.

The Bosch ZU4 and ZR4 instruments are very similar, the former being slightly smaller and varying in a few mechanical details. A longitudinal sectional view of the ZU4 is presented at Fig. 100. The ZR4 dual magneto is illustrated at Fig. 94 and like the ZU4 is enclosed construction, preventing the entrance of water and foreign elements, which impair the efficiency of magnetos.

Both the ZU4 and ZR4 are designed for service with four-cycle, four-cylinder motors, also with two-cycle engines, being driven at crankshaft speed with the four-cycle and double that speed with the two-cycle. By referring to Fig. 100 A the enclosed features of the ZU 4 will be noted. It will be seen that the carbon holder, brush collecting the high-tension cur-

rent is made with a dual contact breaker, which construction is illustrated at Fig. 99. Its details are different from the DU4 and other independent types of magnetos in that a second lever is located under the contact breaker housing in a separate housing, its function being to interrupt the battery current. Its mechanism is independent of the magneto contact breaker, but the interruption of the battery and magneto circuits is simultaneous.

Transformer Coil Utilized.

A transformer coil is utilized with the battery system of the concealed dash type, and with the switch lever thrown to the battery side, and with the motor operating or being cranked, a spark occurs as the battery circuit is broken by the battery interrupting mechanism. To permit of starting from the seat, assuming, of course, that the cylinder is filled with a mixture and on compression, the coil is provided with a vibrator which is operated by pressing a button. The

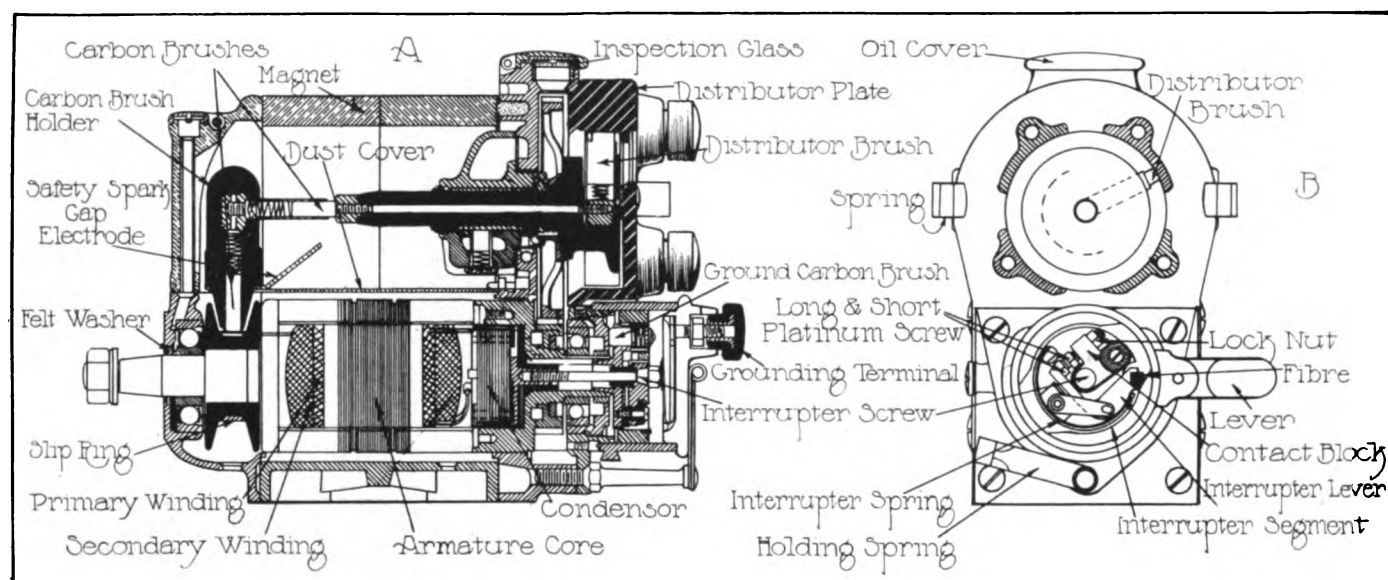


Fig. 100—Sectional View of Bosch ZU4 Magneto, Illustrating General Arrangement of Parts; B, Outlining the Contact Breaker and Distributor.

rent and safety spark gap, etc., are completely enclosed.

Timing Window.

One of the features of the instrument is the incorporation of a timing window, making it possible to ascertain at a glance the segment with which the distributor arm is making contact. This eliminates the trouble of removing the distributor cover when resetting and timing the instrument after it has been removed from the motor. With the new method, it is a simple matter to rotate the armature shaft until the figure 1 appears in the timing window. The terminals are also of an improved type. Throughout the ZR types are noticeable for their compactness, high standard of workmanship and accessibility of parts subject to wear in the normal course of operation.

ZR4 Dual Contact Breaker.

The Bosch Magneto Company produces instruments providing dual ignition, also a two-spark magneto, and a dual two-spark ignition system. The ZR4

action results in a spark regardless of the contact breaker lever position.

The Bosch duplex system, the wiring plans of which, with three and four terminal coils, are presented at Fig. 101, provides two sources of current, either of which may be utilized independently of the other, and in connection with one set of spark plugs. The system includes a primary coil combined with the switch. The latter carries a press button which when operated with the lever at "battery" permits the motor to be started on the switch, provided, however, the cylinder is charged with gas and the motor has not stopped in such position that the contact breaker points are closed. This does not generally occur in practise.

It will be noted that the interrupter cover is provided with two binding posts. The method of wiring requires that the positive terminal of the battery be connected to one of these posts and the negative to the other. Two brushes are utilized in the circuit

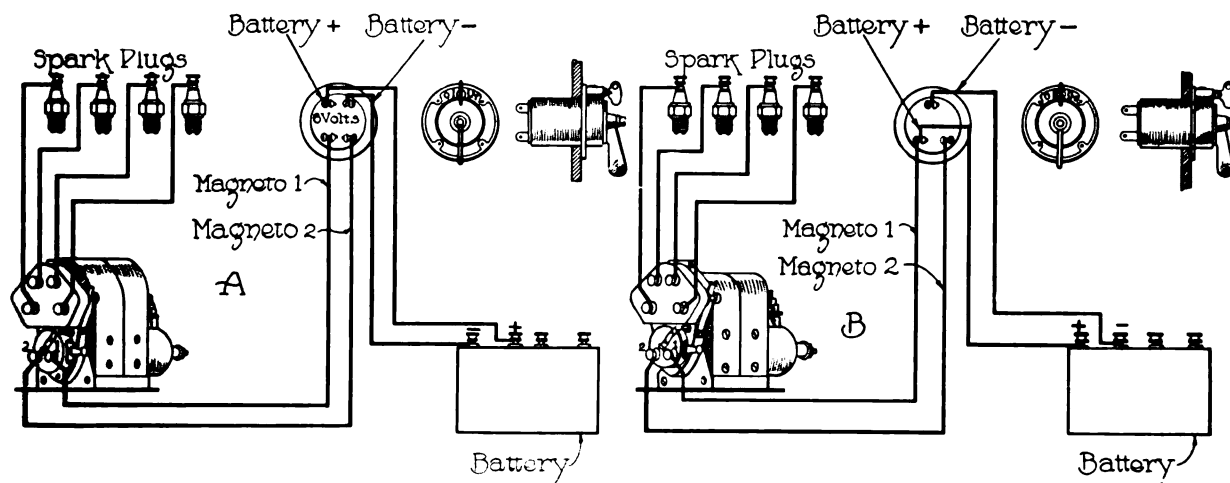


Fig. 101—Wiring Plan of Bosch Duplex Ignition System: A, Showing Method When Coil Is Equipped with Four Terminals; B, How Wired When Three Terminals Are Utilized.

maker housing and the disc or cover to which the segments are secured is provided with two metal segments. When one brush, A for example, is in contact with the segments to which the positive terminal of the battery is connected, the battery current will flow to the carbon brush, through the interrupter points and back through the other brush and post to the negative of the battery.

When the interrupter is closed it forms a path across the segments and the breaking of this short circuit by the opening of the interrupter points results in the production of extra current in the primary coil. The direction in which the extra current will flow will be the same as that of the magneto current and it will complement and intensify it. A half revolution of the nature shaft will bring the other segment in contact with the brush A, and the conditions will be such that the flow of the battery current will be reversed to coincide with the reversal of the magneto current. With the battery properly connected every alternation of magneto current is accompanied by a reversal of the battery circuit. The wiring plan at Fig. 101 clearly shows the arrangement of the system. One of the peculiarities of the duplex system is that the battery

and magneto are connected in parallel and not in series, as with the usual transformer coil system.

Wiring of Cells.

The coil is wound for six volts, and a six-volt storage battery is recommended. Dry cells may be used, however, but 10 must be employed, these being divided into two groups of five each, each group being wired in series and the two sets connected in parallel.

The Bosch independent type magneto may be utilized in connection with a double system of ignition; that is, by utilizing two sets of spark plugs and employing a timer and a coil of the vibrator type, or a timer-distributor and coil, for supplying one set of plugs, and the magneto for the second set. The Bosch vibrator is utilized for starting on the spark, and depressing the starting button causes a constant streak of sparks to flow between the points of the spark plug as long as the depression continues and the distributor brush of the secondary timer is in contact with a segment leading to a spark plug.

(To Be Continued.)

Ed. Note—The next installment will deal with the construction and operation of the Eisemann magnetos.

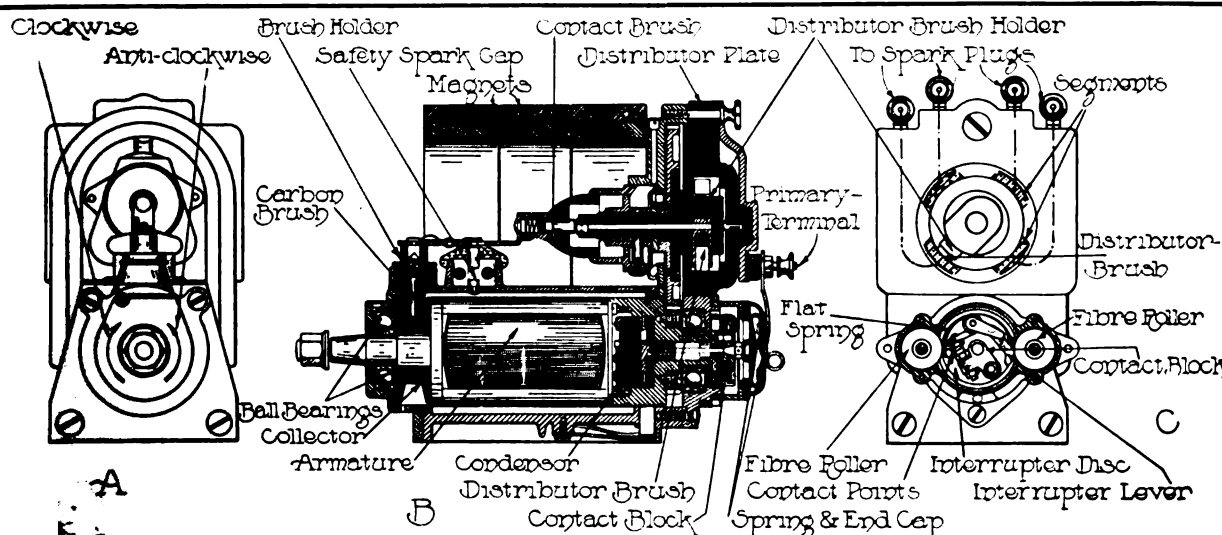
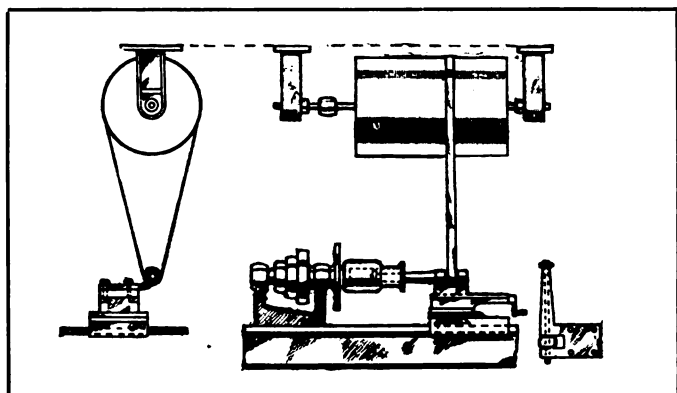


Fig. 102—Bosch DU4 True High-Tension Magneto: A, Driving End; B, Longitudinal Section; C, View with End Cover Removed.

HINTS FOR PROPER MAINTENANCE.

A GRINDING machine is practically an indispensable tool in the equipment of the repair shop or private service station, but some establishments,



Grinding Attachment for Lathe, Permitting of a Variety of Internal and External Grinding.

especially the smaller ones, send work requiring grinding outside. Some machinists display considerable ingenuity in constructing grinding attachments for the lathe and an accompanying illustration presents a plan, the inventor of which was awarded the weekly prize by the Commercial Motor, an English publication.

It will be noted that the design does not employ a floating countershaft. With it the inventor claims he is able to grind hardened steel spindles, camshafts, crankpins, valves, cylinders, etc., and states that in planning the attachment considerable thought was given to have the equipment as rigid as possible and that all parts operated on it should be ground quite circular.

The maker states that the attachment can be used either for grinding internal or external work and that it can be fitted easily to the ordinary lathe. The left hand figure shows the end elevation, and that at the right the grinding spindle and method of attaching it to the tool clamp of the top portion of a compound slide rest. The smaller figure shows a plan of the grinding arm itself, which is somewhat after the style of a Landis grinder. The attachment can be made fairly easily, but if desired can be purchased. For internal work it is provided with a long arm, but for external work the latter is only about three inches in length.

A small pulley for driving the arm is seen located between two bearings, so that it will be realized that there is no overhang to set up vibration. The method of driving the spindle consists of a pair of hangers placed in front of the ordinary overhead shop shaft, and about central with the lathe, so that the attachment can travel about six inches on either side without materially altering the relative position of the driving belt.

The driving drum consists of two 12-inch diameter pulleys about two inches wide. These are placed about three feet apart, and then lagged with strips of

wood one inch in width, these being placed lengthwise and attached to the pulleys by means of set screws. The whole is then skimmed up in a lathe, and it will be found that this makes quite a nice light overhead drum, which gives nearly three feet of travel over the grinding wheel. The small pulley is so arranged that it may be driven off the existing cone pulley on the overhead shaft which drives the lathe. By this means a good increase of velocity is given by the emery wheel.

The cut is put on by means of a cross fed screw in the lathe saddle. If a taper movement is required the top rest is, of course, set to taper just as if one were going to machine taper in the ordinary way. The maker of the attachment states that he considers the rig simple; that it will provide accuracy in grinding, and can be fitted by any average machinist.

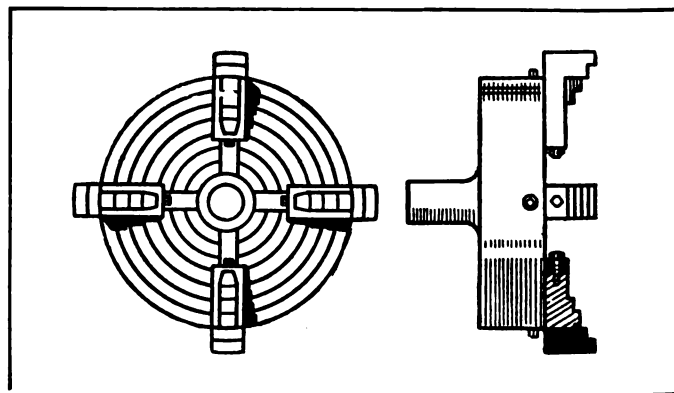
SECURING BRASS PIPE IN VISE.

In replacing a broken brass pipe with new, and when threads have to be cut, the walls will be crushed unless one utilizes caution. A device for securing the work may be made by taking two pieces of wood and boring a hole in the line where they are joined together. The pipe is then placed between the jaws in the half-round holes and clamped tightly in the vise. A little powdered resin applied to the wooden members will prevent slipping.

INCREASING CHUCK CAPACITY.

In the overhaul of the truck it is possible that some machine work will be required that will need a larger chuck than that with which the lathe is equipped. In an accompanying illustration is presented a suggestion for increasing capacity of chuck.

It will be noted that to increase its radius, four extra blocks are machined and rectangular holes provided to enable them to be fitted over the standard

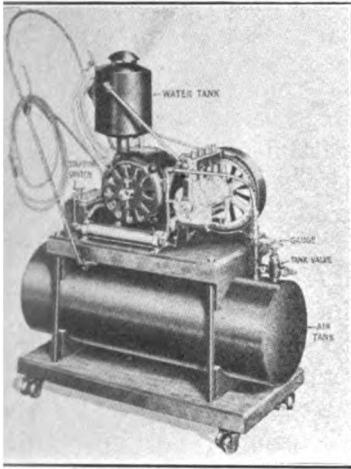


Suggestion for Enlarging Capacity of Lathe Chuck by Fitting Additional Jaws.

jaws. It is stated that in a lathe having a capacity of 10 inches the additional jaws will permit of work up to 14 inches being turned.

GARAGE AND SERVICE STATION EQUIPMENT.

THE Kellogg Manufacturing Company, Rochester, N. Y., maker of the Kellogg four-cylinder power pumps, is marketing the Kellogg electric motor



Kellogg Electric Motor Driven Garage Pump and Tank.

driven garage pump shown in an accompanying illustration. As will be noted, the pump, electric motor and storage tank are mounted as a unit.

The pump is a heavy duty, water jacketed, four-cylinder unit, powerful and compact, and may be connected direct to the tire or to the tank, where air

can be stored at a pressure of 150 to 200 pounds a square inch. A water tank is provided, the fluid circulating around the head of the cylinders of the pump, thence to the reservoir on the thermo-syphon principle. The rings of the pump are of babbitt and the connecting rods of bronze. The pistons are of anti-friction metal. It is leak proof by the company's exclusive cup wash construction. The cams are drop forged steel, carefully ground to size. Lubrication is by the splash method.

The electric motor is .25 horsepower capacity and is operated by silent chain. A knife switch regulates the rotation of the motor, and connected with this is a simple automatic air release, which permits the motor to attain full speed before receiving the full load. The maker states that this eliminates troubles experienced with fuses.

Two gauges are provided. One, conveniently located, indicates the exact air pressure in the storage tank, which is tested under 500 pounds pressure to the square inch, and the other is incorporated in the tire

The platform on which the equipment is mounted is fitted with rollers, permitting it to be moved about the garage or to the sidewalk when a tire is to be inflated with air stored in the tank. As previously mentioned, shoes may be inflated from the pump direct if desired.

The motors are supplied for either alternating or direct current, and when the former is to be used it is essential to state the number of cycles. In considering the installation of the equipment the maker states that it is important that the voltage be known that the motor must receive its full number of volts if efficiency is desired. The Kellogg equipment comes complete or without the tank. The Kellogg Manufacturing Company will supply complete details on re-

quest. This concern also manufactures power air pumps.

HEALY VALVE RESEATER.

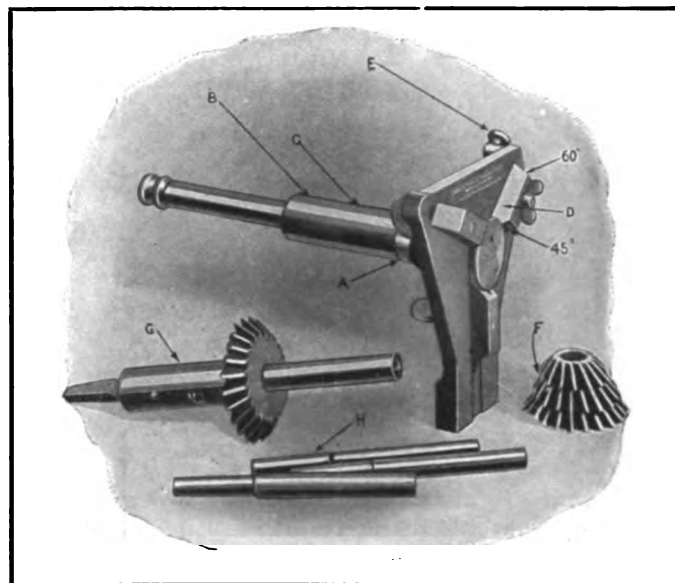
The Healy valve reseater and dresser is manufactured by the Healy Tool & Appliance Company, Brocton, N. Y., with New York office at 1790 Broadway, of which Ralph Walcott is manager. The complete equipment is shown in an accompanying illustration with the components lettered.

A bearing on the valve stem is provided at A, it being in the same relative position as to seat as is the bearing in the cylinder. This bearing coming so near to the valve head eliminates chattering while the valve is being dressed. A second valve stem bearing is provided at B, it holding the stem central and rigid while a cut is being made. The adjustable bearing handle is shown at C and it may, by a few turns, be adapted to any size valve stem or worn members.

The reversible face cutter D has a 45-degree cutter at one end and a 60-degree at the other. These being adjustable, a roughing cut may be first used, then a finishing cut, without disturbing adjustments.

The adjustment of the face cutter is depicted at E. It can be set to the thousandth of an inch. The seating cutter F is so shaped that it will remove all shoulders. The cutter carrier G has a taper which corresponds with that of the cutter, aligning it perfectly in the carrier. A Brown & Sharpe taper to the pilot aligns the same perfectly with the cutter, as shown at H.

The tool is operated by hand; all wearing parts are of tool steel, hardened and ground to exact proportions, and the equipment comprises a dressing head



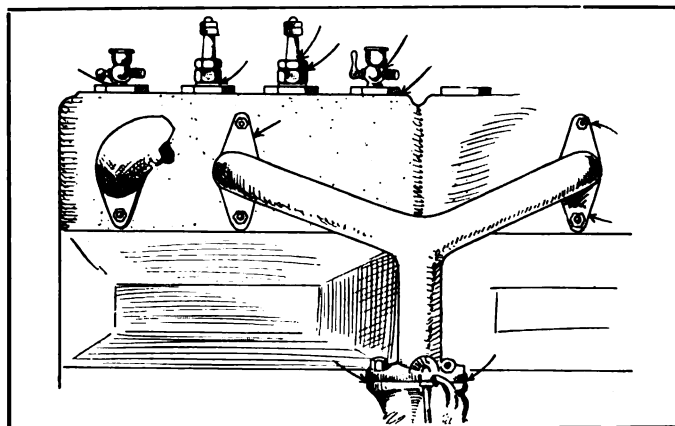
Healy Valve Reseater and Dresser, a Complete Equipment.

complete with an extra roughing cutter, also one each of 1.625, two, 2.25 and 2.5-inch valve seat cutters and carriers. The pilots are: .3125, .375, .4375 and .5 inch.

CORRESPONDENCE WITH THE READER.

Testing for Auxiliary Air.

(54)—In the instruction book of the truck I drive it says: "Be careful in replacing the motor gaskets so that auxiliary air will not be admitted". What is the cause of it and what



**Fig. 1—Probable Causes of Auxiliary Air Indicated by Arrows
—Worn Valve Guides Are Also Responsible for Extra Air.**

are the effects? In what other places may auxiliary air be present?
DRIVER.

Boston, Dec. 28.

By auxiliary air is meant extra or additional air. It should be borne in mind that the mixture is obtained by mingling so many parts of air with one of fuel, this being performed by the carburetor, and taking place when the piston descends on the intake stroke. This suction stroke draws air through the carburetor, mingling it with the fuel, and the resultant mixture is sucked into the cylinder.

Any openings between the carburetor and the cylinder will permit of extra or auxiliary air being taken in, which results in diluting the mixture; that is, weakening it. If the proportions of air in the first place were correct, the additional air generally will create such a lean mixture that it will not ignite easily. Usually the motor will miss at low speeds. but operates properly at higher ratios.

There are a number of places where auxiliary air may be taken in. At Fig. 1 is presented a sketch of a motor with arrows indicating points where auxiliary air may exist and in addition to those depicted the valve guide stems may be offenders. Worn valve stem guides are noticeable in old motors and frequently are the cause of the difficulty experienced in adjusting the carburetor for an all-around mixture.

With auxiliary air the low speed must be enriched to prevent missing, but usually too much gas is then present on the high speed, which results in heating. The spark plug and priming cup fits may be tested with oil and if any leaks exist bubbles will be given off. A better method is to employ soap suds, especially if the leak be a small one. The intake members may be tested by using gasoline and noting the action of the suspected cylinders when extra fuel is led to them.

Disassembling Differential.

(55)—Am planning to overhaul my machine, which was a pleasure car. I do not understand how to proceed with the differential. The axle is of the full floating type. Any suggestions, with illustrations, will be appreciated. I would state that I cannot obtain an instruction book and wish to do the work myself.
MOTOR TRUCK READER.

Fitchburg, Mass., Dec. 24.

The method of disassembling the differential is shown at Fig. 2, the steps being arranged in alphabetical order. With the full floating type axle it is not necessary to jack up the wheels, as the driving shafts or axles may be displaced with the wheels on the ground.

The housing plates A and B are first removed, which will expose the differential. If the driving gear C is to be taken out the slip joint member will have to be displaced. The retaining clamps D are held by bolts and by taking these out the differential as a unit may be lifted out of the housing P. The differential E then may be placed on the work bench for disassembling.

It will not be necessary to remove the large gear unless repairs are required. It is secured to the housing shown at F by bolts, and it will be noted that these are wired to prevent their becoming loose. The housing F is in two sections, each containing a gear as shown at G and K, four bolts holding the two parts together. The two gears with the spider and its small gears may be displaced as a unit as indicated at N. The spider assembly is depicted at O. The reassembly is made by reversing the order outlined.

After doing the needed work, be careful to set up all nuts and bolts snugly. Lubricate the bearings and small gears with oil and pack the entire assembly with grease. It is advisable to test the differential in the housing for lost motion—side play—and if any exist take up on the bearings, if of the adjustable type. In

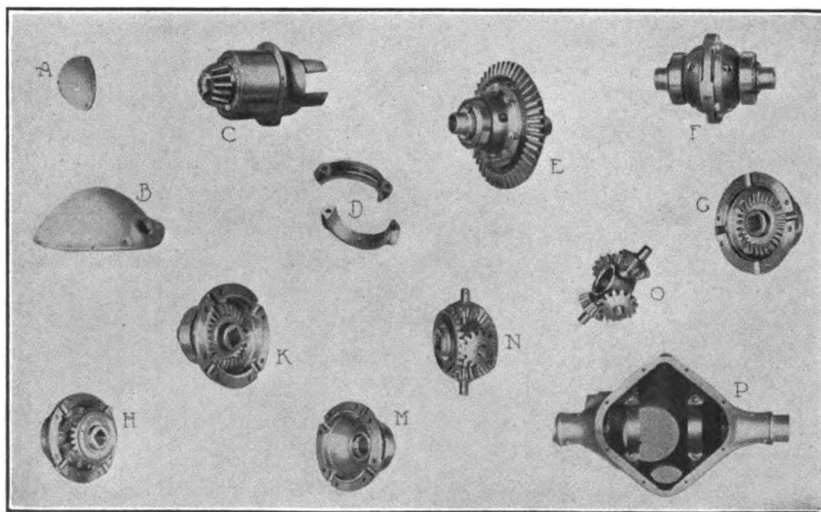


Fig. 2—Illustrating the Steps Taken in Disassembling Differential of Full Floating Type of Axle.

this work care must be taken to rotate the adjusting member the same number of turns on each side. It should not be too tight and ought to rotate freely.

TRUCK FREIGHTAGE FASTER THAN TRAIN.

Single Machine Carries Six Tons Each Way Nightly Between Boston and Providence, Saving Time of Men and Equipment for Company and Better Serving the Public.

OPERATING its principal service between Providence and Boston, the Boston, Providence & Fall River Express Company carries the bulk of its freight between these cities by motor truck, competing with the railroad and large express companies, and making deliveries in quicker time and at less cost. This is not an experiment, for it has been operated since March, 1913, and experience has shown that the company can afford its patrons service that cannot be equalled by other concerns. Up to the time truck transportation was begun the company had shipped its freight by railroad. The management, with the desire to promote and develop patronage, had made every endeavor to expedite shipments, collections and deliveries, and the possibilities of quicker transportation, with arrivals and departures that would better serve its customers, led to the use of the machines.

The company was established a number of years ago with a service that consisted of horse and wagon at Providence and a similar outfit at Boston. Packages were collected and delivered in either city, shipments being made by fast freight trains that were supposed to leave each evening early in the evening, arriving in time for delivery the next morning of the following day. The distance between the geographical centers of the two cities is 45 miles, and the purpose of the road was, and now is, to

haul the fast freight cars through during the night, bringing all receipts up to 6 in the evening, that these could be ready for delivery to the consignees the morning of the next day. Regular freight might be in transit two or three days to a week in transit, but to meet the demands of business men the special fast service was inaugurated.

Special Delivery Service.

From its inception the company's business was devoted to serve those who did not maintain vehicle equipment, giving to its customers quicker, and cheaper, service than that afforded by the large express companies, or, in other words, making special delivery instead of general distribution, and with the use of giving an attention that could not be expected from other concerns engaged in similar, but diversified, transportation. The railroad had as its purpose the shipment of the freight accumulated

during the day, sending it all at one time, this economizing cars, clerical work, and general expense, the belief being that this would work out to better results than were shipments made more frequently and in less volume, leaving to the express companies the transportation of the packages urgently required.

This condition does not differ materially from that in other localities so far as freight transportation is concerned, the interests of the large express companies, which are largely owned by railroad corporations, being conserved so far as possible by the contracts and traffic agreements entered into by them, although nominally having separate existence. So long as the public is dependent upon railways for the haulage of freight the business interests of any community must be largely, if not wholly, subordinated to the fa-



The Five-Ton Peerless Truck That is Driven a Round Trip Between Providence and Boston Six Days a Week, Carrying a Full Load of Freight, for the Boston, Providence & Fall River Express Company.

cilities of these corporations, and service is generally based on volume carried. The people have the choice of which will best serve them. The freight is usually hauled at either end of a shipment by other interests, but the express companies usually collect and deliver, although shipments may be made between points without this service. But the rates are based on collection and delivery, unless the business transacted at any given point is so small that no vehicle equipment is maintained there.

Changes of a Decade.

Considering the freight and express business between Boston and Providence, a careful analysis fails to show that any progress has been made in a decade, so far as expediting shipments and minimizing expense is concerned. Additional freight cars have been sufficient to meet the requirements of excess shipments without extra trains, and the express companies

have met all demands upon them in much the same manner. The increase of volume has been provided for without giving the business men faster service, and the expense is greater, there being no decrease in prices as a rule, or no change until the parcel post rates compelled reduction with reference to packages of small size.

Probably this is one of the principal reasons why the Boston, Providence & Fall River company has steadily developed in proportions. With a view of increasing its patronage the company established agencies in Fall River, New Bedford, Pawtucket, Woonsocket, Attleboro, North Attleboro and Taunton, having direct representation in these towns and cities, and later became affiliated with the Bay State Street Railway Company, which maintains a freight and express service, in connection with which it represents that company in Providence, and has contract with the Rhode Island Company to transport its business between Providence and Fall River. In addition the company maintains an express service between Providence and New York by steamer.

Developing the Business.

The development of the business is extremely interesting, largely from the fact that the company forwarded and received its freight by the railroad, but by specialized handling received it later and delivered it earlier, this service creating patronage and attracting business men who found it especially desirable to them. As a matter of fact this condition may be found in nearly every community of such size that highway transportation equipment is necessary, and where trade is even in moderate volume.

The average express business of today is systematized much as is the postoffice department, so far as shipment and delivery is concerned. Special express trains are operated where the volume of business is sufficient and from large commercial centres through cars are loaded that are either completely made up and sent to distant points, or receive packages at stated points. In other instances the cars are included in passenger trains and are delivered at the destinations at regular times. But no matter when received deliveries are made by routes, and these are served at stated intervals, once or more daily. The frequency of delivery depends entirely upon the volume of freight and the proportions of the city or town.

Question of Rates.

The Boston, Providence & Fall River Express Company had to use the fast freight of the New Haven railroad, and at its terminals horses and wagons were used for collection and delivery, these being the same facilities as were used in the service of the large express companies. But instead of route deliveries and the consequent delays, special distribution was expected to be of such material advantage to the business man as to impel his attention. But an additional inducement was the rate for transportation, which was fixed as 75 per cent. of the express companies' prices, but 50 per cent. more than railroad freight charges.

One reason for establishing the intermediate rate between the fast freight and express prices, was the necessity of attracting a sufficient volume of patronage to insure a reasonable business. The specialized service seemingly offered advantages to justify charges equal to those of the express companies, considering the substantial saving of time, but in addition to this there would appear to be every reason for business men to support a company that could afford them protection through its competition with the railroads and express companies. Experience has been that promotion of patronage for competing concerns is beneficial to the people as a whole.

Utilizing Motor Trucks.

Not until motor trucks became well recognized as practical utilities did Manager W. S. Brown consider the possibilities of using them between Boston and Providence for the haulage of freight. He was doubtful as to results in so long a haul, but after making careful investigation made contract with the owner of two trucks to have the freight carried overland between Providence and Boston, two trips to be made daily, leaving Boston at noon and at 7 in the evening, carrying the loads through from one receiving station to the other without stop. The intention was to use the trucks for the freight sent by railroad, but shipping twice daily instead of once, and making possible the delivery in Providence of packages received up to the time of departure from Boston at noon before the close of the business day.

Service Begun with Two Peerless Machines.

The service was begun in March, with two Peerless trucks, one of three tons and the other four tons capacity, and the schedule arranged was for four hours' running time. As planned the truck leaving Boston at noon would be in Providence by 4. This truck was loaded at Providence as soon as practicable and sent back over the road, leaving not later than 7 in the evening, and reaching Boston about 11. The truck leaving Boston at 7 in the evening reached Providence about 11 at night, unloaded and again loaded, so that it could be sent off by 1, that it would be in Boston early in the morning with the second load.

The reader will understand that this service was intended to directly benefit the business men of Providence. The company operated eight single-horse wagons in Providence and a similar number in Boston, for collection and delivery. The Adams Express Company received packages early in the day at either its Boston or Providence offices and delivered them in either city in the afternoon, but unless received by 9:30 distribution could not be depended on. With the use of the truck packages could be received in Boston up to 12 and delivered the same afternoon at a saving of 33 per cent., this ratio of saving being based on the lowest price established for the work.

Transportation Costs.

In connection with rates, the value of collection and delivery must be considered, and as an illustra-

It may be stated that a large Providence shipper, who has figured costs of transportation very carefully, has found that it is more economical to send packages weighing 250 pounds or less by express, for the price paid includes handling, hauling and transporting, and eliminates the expense of maintaining equipment and men to do this work. But when packages weigh more than 250 pounds the difference in rates is such that they can be sent cheaper by freight. This is based on general conditions and the supposition that there is sufficient work for men, animals and vehicles, and it does not take into consideration the value of the quicker transportation.

The freight rate between Boston and Providence is 100 cents a 100 pounds, for packages of that weight or more, but smaller packages are carried at considerably higher rates. The express rate is 40 cents a 100 pounds, with the charges graduated for smaller units, while the charge made by the overland company is 30 cents a 100 pounds. The most profitable business is in smaller packages, but there is reason for the great ratio of price, as there is precisely the same clerical work to be done with a bundle weighing one pound as with one of 250 pounds, and perhaps a dozen handlings, as many deliveries, and the time of a man, horse and wagon for possibly a considerably longer period, so that comparisons by weight alone cannot be justly made. This statement is made for the purpose of showing that with a rate of 30 cents a 100 pounds a large number of packages might earn for the company an average of 40 cents or perhaps more.

Saving in Time.

The truck service was found to be a distinct saving in time, which is a decided benefit for the consignees. To illustrate: A shipment of a car from Boston at 7 o'clock meant that the last package could not be received later than 6, and after the records had been made up and the freight delivered to the receiving station of the road the train was dispatched as soon as made up. On arrival at Providence the car was placed in the freight shed and in the morning delivered to the freight office, unloaded, the records made, the packages sorted and delivered to the teamers, then delivered to the company, redistributed and sent out by wagon, as routine was followed at Boston. But in the event of delays in handling the cars in the freight sheds, in unloading the freight, in making the records, and in the customary congestion of vehicles in the streets and at the freight houses, hours may be lost. Before the trucks were used the drivers, horses and wagons were kept waiting at the office or at the freight house until the shipment of the night before was ready for distribution, and not infrequently the wagons could not be started out until 9:30 or later at Providence, while at Boston under favorable conditions freight could not be distributed until 9:30 and from that time until 11, or even noon. This was not peculiar to the business of this company, for practically all shippers have like experience. The loss of time and the increased expense entailed, to say nothing of the dis-

satisfaction of business men, was the reason that prompted the use of the machines.

To facilitate the business, when the trucks were placed in service the records were made up, for a waybill is made out in regular form, as the packages were received, and with a truck waiting at the office freight could be taken up to the time of leaving. This insured making every call and serving every customer up to the close of business. At the Providence office a man was placed on night duty who prepared the waybill and made up the records of every package received up to the end of the business day. On the arrival of the truck at 11 the freight was unloaded, the record written and as quickly as practicable the machine was loaded and sent back. In the Providence office the local delivery sheets were written, the freight sorted for routes, and it was in readiness for loading when the drivers arrived with their wagons in the morning. As might be assumed, this meant an extremely early delivery, and by 7:30 the drivers and their wagons were on their routes, and with a saving of from two to three hours that had previously been occupied with waiting and handling of freight. With all of the preliminary work disposed of by the night man, attention could be devoted to the early shipments by other lines that came through the freight houses and by steamer. With the reduction of the Boston shipment the volume of business to be handled immediately was relatively small, and this meant opportunity for doing more work with the same equipment and the development of patronage.

At Boston, the arrival of the truck load of freight at 5:30 or earlier made it possible to have this unloaded, written up, sorted and ready for distribution by 7:30, and this was a big relief as compared with the conditions previously existing, the results being similar to those obtaining in Providence. Both at Providence and at Boston the packages received up to the time of departure were made in readiness, and in the latter city the truck was brought to the terminal and loaded, freight being taken up to the minute of departure.

Endurance of Machines.

The systematization of the work required comparatively little time and from the first day the gain was large and the service so satisfactory that there was no doubt of the success of the plan, but the one matter of doubt was the endurance of the machines under so long a run at capacity loads. One round trip for each truck was more than 90 miles a day, and this was for six days a week. This would mean about 550 miles weekly, or a total of close to 28,000 miles a year, unless the machine was withdrawn from service. This appeared to be a very large mileage, carrying the loads required to be profitable, and the doubt was whether the machines would endure as long as was estimated.

Careful estimate of the cost had been made by the contractor, he being guided by the advice of other men engaged in truck transportation, and with this as a

standard, record was kept to determine whether or not the trucks were economical. The contractor was paid a flat price for a trip, and the load was large or small, just as conditions developed, for departures and arrivals were necessarily on schedule. Experience showed, however, that the three-ton Peerless machine was too small for the work, as the character of the load, generally bulky, and the long haul, made necessary the carrying of larger freights than could be handled with this vehicle. By this is meant that to be operated at a satisfactory profit at the rates charged a load of five or six tons should be carried. The cost of operating a six-ton truck is comparatively little more than a machine of half that capacity, and with a six-ton load the earnings would be sufficient to justify the use when contrasted with other forms of transportation, but the earning power of a three-ton truck would not be sufficiently in excess of the operating cost to warrant its use in work of this kind.

Larger Equipment Needed.

After an experience of three months the contractor decided that he could not continue with the equipment he had, for larger loads were necessary for him to make a sufficient profit on his investment. Accordingly the contract was terminated and the company purchased the large machine and sent it to the Peerless branch at Boston, where it was rebuilt to the extent of replacing the springs, axles, wheels and tires with parts the same size as those used for six-ton trucks, and it was then placed in service, leaving Boston each day at 7. Since July the truck has been driven over the road each day, carrying a load up to six tons, and making the round trip of 90 miles or more with but one delay, when the machine was held in Providence by the driver. As a matter of fact he might have gone through with the truck, but he was over-cautious.

The truck is operated on the schedule stated for the departure at 7. It is loaded at Boston late in the day and started promptly on time. The run through to Providence is made in from three and a half to four hours, and usually it is in before 11. The load is taken off and it is reloaded, leaving for Boston between 12 and 1, and reaching there usually by 5 or 5:30. There the freight is taken to the receiving station, where by 7:30 the load is ready for distribution by the wagons. The truck is sent to the stable, where it is kept until perhaps 4:30 or 5, when it is sent to 65 Pearl street and again loaded for the Providence trip. Four afternoons of the week, however, the truck is used for hauling freight from the railroad yards, and this considerably increases the weekly mileage.

Saturdays the truck leaves Boston according to the schedule and goes back from Providence with the load accumulated during the day, reaching Boston early Sunday mornings. No trip is made Sundays, and this arrangement allows the 36 hours between Sunday mornings and Monday nights for whatever attention may be necessary. With the work required of this machine the necessity of systematic care is

realized, and while the driver is expected to make adjustments and minor repairs, any work of consequence is done at the branches of the Peerless company. This insures the machine being in good operating condition at all times.

The machine has a body that will permit the carrying of a freight of large bulk, and it is often sent out with a load piled so high that it will just clear the trolley wires in the streets. The use of a standing top with loads of such size is not practical, so the freight is covered with tarpaulins, that afford ample protection, and the driver is sheltered by the cab.

Value of the Service.

When the day's freight is in excess of the capacity of the truck the surplus is sent by railroad, and the experience with this is practical evidence of the superiority of the machine for this character of work. The saving in time and the benefit to the business men is a very large factor with the company, and this has been obtained by the use of the truck. Recently the machine was off a few days for an overhaul and during this time the freight was sent by train. The difference in the service was so pronounced that every customer of the company was anxiously inquiring when the machine would be ready for operation. Probably no better demonstration of the actual value of the truck service could have been made to them, and they realize now very keenly the advantages they have in the overland express.

Manager Brown states that the cost of operating the truck for freight purposes is more than was estimated before the practical experience with the machines, and the expense for transportation may be said to approximate that of railroad haulage, but being largely independent and in a position to arrange its service to meet the requirements of the business men, and to make deliveries early each business day, are extremely important factors in influencing patronage. Besides this, there is the extremely moderate rate. The intention of the company is, early the coming spring, to add another truck to the Boston-Providence service, and this will leave Boston at noon and give Providence the same late afternoon delivery it had when the two trucks were operated.

Fall River and New York.

There are, of course, conditions when overload freight and express haulage would not be as productive, as between Providence and Fall River, for four shipments are made daily by electric express, and the collections and deliveries are made by this company. The distance between points is 22 miles, and there is no steam road service. The cars are dispatched on practically passenger schedule, are handled quickly, because there is no congestion at the freight houses, and the freights can be sent out for delivery with comparatively little delay. This demonstrates the possibilities of the railroad that can make car or partial car shipments as against the road that must operate its cars in trains and, so far as possible, fully loaded.

The company's express business between New

and Providence is carried by steamer, and this facilitates final collections in season for the sailing of 1913, which is a handicap in competition with the other companies that can make collections as late as 9 o'clock in the evening in New York and have the packages in readiness for delivery in the morning. In Providence, however, the collections can be made to the close of business hours. There is an advantage in the fact that the delivery is specialized, made of by routes, and at both ends the deliveries are generally earlier. The difference in the rates, however, and the fact that a great deal of the business is in New York, to a considerable extent offsets the advantages of later collections in that city for east end business.

The highway between Boston and Providence is in good condition, the greater part of the surfacing being gravel or oiled, and the grades as a rule are not steep, although there are several long hills. The route is through Pawtucket, North Attleboro, Plainfield, Wrentham, Walpole, Norwood, Westwood and Attleboro, following the highway that is Washington Street from the Rhode Island line to the Charles river in Boston. When the line was established the purpose was to give each of these towns an express service to Boston or Providence, but the business at either end was so large that this was for the time being abandoned. With the installation of another truck it is probable that deliveries and collections will be made on a regular trip, which will add materially to the volume of business and better serve the business interests at the terminals and along the route. The Peerless truck will go through the winter, and a new machine will take its place while it is being overhauled, and then it will be used regularly. That is the plan unless a change is made.

NON-GRAN BEARING METAL.

Non-Gran bearing metal, manufactured by the American Bronze Company, Berwyn, Penn., is claimed by the manufacturer to have unusual qualities in that the structure of the metal is fibrous instead of granular and for this reason extremely enduring while under frictional stress. The metal has been developed with extreme care for the use specially made of it, and this is made of the necessity of having bearings that will endure, for without these motor efficiency is impossible to secure and constant expense is entailed in repairs. The maker maintains that the metal is especially desirable for use with motor service wagons because of its long endurance and comparative economy.

The Steel King Motor Company has been incorporated in Detroit by Jerome Remick, Samuel Mulford, Stair, W. T. Barbour, Charles A. Dean, A. A. Metz and J. F. Nagle to manufacture tractors and traction plows. A factory is to be established at Lieber streets in Detroit.

GMC PRICES REDUCED.

Abandons Unlimited Maintenance, Free Service and Trading for Old Trucks.

The General Motors Truck Company, Pontiac, Mich., inaugurated Jan. 1 a new policy that includes a very substantial reduction in prices of both gasoline and electric wagons and trucks, the elimination of free maintenance service, sales for time payments and receiving old machines in partial payment for new vehicles. But the guarantee against defective material or faulty workmanship is continued as before. The statement is made that the GMC machines will be sold at the lowest cost that is consistent with high class products. This reduction is very generally applied to the entire list of machines built, and while the maximum is \$1500 for a five-ton gasoline truck and the decrease will be from 33 to 22 per cent., with this line, the electric vehicles will be sold from \$185 to \$675 less than before.

Vice President and General Manager W. L. Day states that when motor trucks were more or less experimental they required close supervision by the manufacturer, which developed "free" service, which necessarily entered into the price fixed by the builder. In addition to this unlimited maintenance agreements placed a premium on neglect and abuse and created a very costly burden for the manufacturer. The conditions caused high prices and to offset these time payments were accepted by some and prices were indirectly reduced by excessively large allowances for used machines. These factors are believed to be materially responsible for the price scale of motor wagons. The company has realized the effect of these influences and in establishing its new policy believes that the expansion of the market and the increased volume of factory production will justify the sale of machines at much lower prices, the distinct beneficiary being the purchaser. The buyers will undoubtedly assume a new responsibility toward their investments, and this will eliminate the need of favors of the manufacturer, regarded as gratuitous, but necessarily considered in the market price.

The Heinze Electric Company has established a sales office and service station at 1876 Broadway, New York City, which is in charge of P. G. Sedley, where a full stock of ignition specialties will be maintained.

The campaign for funds for the construction of the Lincoln National Highway is being actively waged, and contributions are constantly being received at the headquarters of the association in Detroit.

E. M. Lamb has been transferred from the management of the service department of the Gramm Motor Truck Company at Lima, O., to the Gramm Canadian Company at Walkerville, Canada.

TRUCK AN ECONOMY IN SHORT HAULS.

Large Crew for Machine and Quick Loading and Unloading Develop Satisfactory Results in Extended Experience of a Woonsocket, R. I., Haulage Contractor.

TO WHAT extent the people of any community are dependent upon transportation facilities is seldom realized by them. A very small proportion of the residents of town or city may have some knowledge of conditions, but the majority are blissfully ignorant of facts that would cause decided uneasiness were they known. This is particularly true of inland manufacturing communities, where the food, fuel, raw material used by the industries, building materials, supplies of all kinds, etc., must be received by railroad, and from railroad terminals distributed and redistributed. All shipments sent out must be made by the same lines. Obviously, the cost of transportation by rail and road vehicle must be paid by the people, and the handling alone becomes a considerable item. As this expense is regulated by the profit of those engaged in transporting competition is essential that it

handling the shipments and receipts would be ideal, but this condition is not often realized by the people. In few instances has this need been anticipated and provided for. Frequently the possibilities for economy have been ignored.

Freight Yard Facilities.

Until Jan. 1, 1914, the freight sent from and received at Woonsocket, R. I., a community of nearly 50,000 people, over the New Haven road, which monopolizes all railroad haulage to that city, was handled at six different yards scattered about the city, and beginning the first of the year it has been concentrated in a new yard. This is no doubt economical from the viewpoint of the railroad, but as all freight of less than carloads, and all carloads when there is no spur track on the property of the receiver, must be received there, the industries and commercial enterprises must haul such receipts to the shops, mills, factories, stores and warehouses.

This has revolutionized the haulage conditions and has increased the cost materially. Those who are engaged in vehicle transportation have found the need of additional equipment to handle the same volume of business, and as yet there is a good deal of uncertainty as to what will be required to do the work. There will be an advantage in having the shipments received at one point, which will eliminate searching for cars in different freight yards, the necessity of carrying partial

loads at times, and working in congested conditions, but the hauls will be much longer as an average. Coal, building material of all kinds, raw material for the manufactories, and the like, will be received in the freight yard, and the facilities for handling these must be provided by the transportation companies.

The Woonsocket Teaming Company.

The Woonsocket Teaming Company, owned by A. J. Sutton, is one of the largest contractors for highway haulage in the city, and is now using about 50 horses. While work may be said to be general in character, a great deal of it is for mills, for these plants do not maintain transportation equipment. Fuel, raw material and supplies are delivered to the mills and manufactured products taken from them. During the spring, summer and autumn a good deal of hauling is done for builders and those engaged in con-



Main 3.5-Ton Truck Utilised for Short Hauls Between Railroad Terminals and Mills by the Woonsocket, R. I., Teaming Company.

be kept at what may be regarded as a reasonable standard.

Railroad rates are usually governed by competition or by the approval of the Interstate Commerce Commission in the event of monopoly of the service. Rates within a state, however, are not subject to the regulation of the federal authority. Because of this fact state and interstate transportation charges may differ considerably, the shorter hauls generally costing more in proportion. Highway transportation is usually regulated by those engaging in it.

Vehicle haulage is from some recognized centre. It may be one or several freight yards, or from these receiving points and from piers or docks in the event of there being water lines. From these centres distribution radiates according to the needs of business. Concentration of terminals and adequate facilities for

struction. Household property is often moved and incidental service is given.

Anticipating the changed conditions, Mr. Sutton purchased a 3.5-ton Mais truck late in the summer and began experiment to determine just how it could be worked to good advantage, keeping careful record of the work done and making comparison of the expense with cost of animal haulage. Mr. Sutton has for a number of years had record of the work done for different concerns, and this was found to have a material value in determination of the economy of the motor truck. Because of the widely differing work and the fact that it was not possible to keep the machine constantly engaged in one class of service, the record covered a great deal of detail that was seemingly fragmentary, but it was found to be of decided worth in developing methods that make for economy.

Some of the mills receive bales of cotton and wool, and in hauling these, though the distance was comparatively short, the experience was that it would be practical to have a crew of three or four men and by quick loading and unloading to do the work comparatively cheaper than with horses, because the machine could make fast trips and could carry capacity loads. The same experience resulted with the haulage of cases and large packages, and as the greatest loss of time was in freight yards, decision was made to have a foreman, checker and several men at the new freight yard, who would collect the loads and have them ready for hauling as fast as the vehicles were ready to receive them. By this method quick loading was insured and with a sufficient crew on the truck to unload quickly the lost time was minimized. As to the driving, the expectation is that the truck will go between points as fast as conditions will permit, and the loads will be as large as can be carried consistently.

Handling of Goods.

The methods that obtained with horses before the change of conditions would mean a large proportion of lost time, because finding cars and moving freight could not be otherwise than slow work, and generally the crews were small. In anticipating the need of economy of time it was essential to ascertain the possibilities with the machines, and this could only be done by practical experiments to learn where the changes could be made, and after comparison of cost to modify the methods and by careful supervision determine the efficiency of these. In this manner it was possible to develop what is known will be productive of good results, and to improve upon these will be practical with greater experience and more careful systemization.

The handling of baled goods and packages with trucks is certain enough to be economical, but what can be done with coal has yet to be learned. The coal brought into the freight yard in cars and thus far it is shovelled into the carts. Experiment is to be made with loading machines that can be placed in the cars and operated with electric motors. The railroad has

made as yet no provision for discharging the cars by gravity and the loads cannot be left beside the tracks, so the contractors must necessarily develop such methods as will best serve them until such time as the changes are made that will permit of a greater measure of economy. The contractors using horses have no particular need for economizing time, but when trucks are in service every minute counts, and the material saving must be made in handling.

Mr. Sutton has just received his second Mais 3.5-ton truck, and three more are to be delivered to him early in the spring. He purposes to utilize these in general work, and the experience he gained with the first machine will be of material advantage to him. He believes that the economy is sufficient to justify the use of trucks in a large part of his business, although he will not dispose of all of his horses. Where operating cost shows economy of motor or animal vehicles that which is most productive will be used.

The value of the experience stated is that practical common sense methods were employed to determine how a condition could be met, and results obtained from experimental service will go a long way toward realizing the fullest utility of motor trucks. Material changes were necessary, but adaptations were made that were productive, and others will be adapted if occasion requires. The motor vehicle is regarded as least profitable in the short haul, but quick handling of freight is the solution of the problem. In work that requires longer hauls, however, there is quite as much need of expedition.

A remarkable saving was made by a contractor in an eastern city who has a six-ton Garford machine in his service. A recent work was the cartage of material weighing 2302 tons a distance of 3997 miles at a cost of 5.4 cents a mile for fuel and oil. This is claimed to be 25 per cent. less than the cost of feeding a sufficient number of horses to do this work.

A dividend of 1.5 per cent. on common stock, two per cent. on first preferred stock and 1.5 per cent. on second preferred stock has been declared by the United States Rubber Company, payable Jan. 31 to stockholders of record Jan. 15.

Proposal has been made to the stockholders of the Cass Motor Truck Company, Port Huron, Mich., to reorganize that concern, taking over the property and assets and considerably increasing its productiveness.

The Klingsmith Electric Truck Company has been organized by J. M. Klingsmith, M. F. Cure and E. F. Tiller of Chicago, Ill., with capital of \$350,000, to manufacture electric wagons and trucks.

The factory of the Singer Manufacturing Company, South Bend, Ind., has been bought by the South Bend Motor Works, and it will be utilized for the production of trucks and fire apparatus.

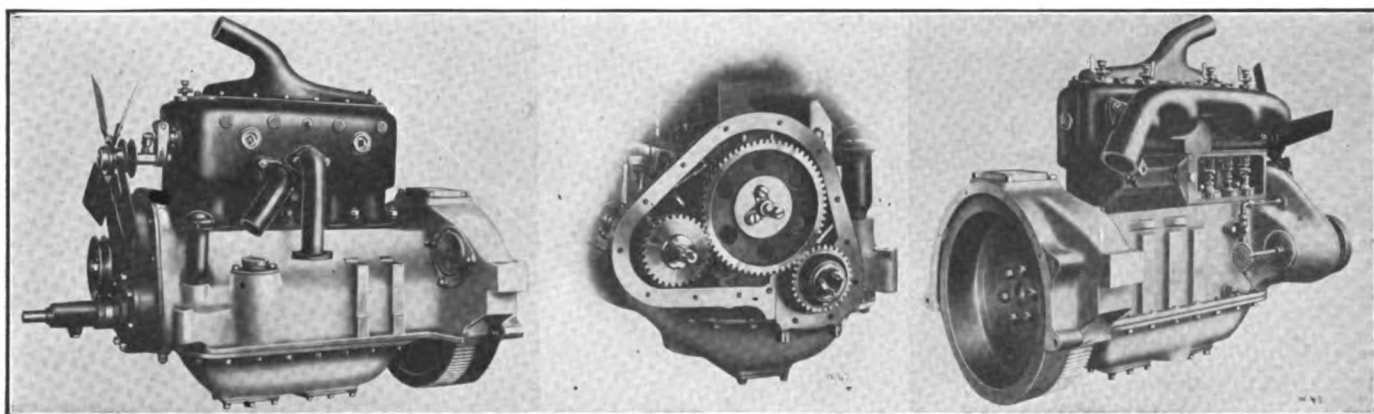
THE CONTINENTAL MODEL N ENGINE.

THE Continental Motor Manufacturing Company, Detroit, has begun the commercial production of a motor known as model N, which is the smallest engine ever built by that concern. The motor is intended for use in vehicles where light weight of power plant and moderate capacity will serve to meet all requirements. This creation is in line with the general purpose of designers to gain power by the combination of small bore and comparatively long stroke, and to secure economy of fuel consumption, these being essentials with the light machine that can be operated at minimum expense and yet have sufficient speed for all normal purposes. There is undoubtedly a demand for machines of reasonable power for service, and there is even greater need of economical operation, for engineering progression requires endurance and workmanship that will be the equal, if not the superior, of motors used for pleasure vehicles.

The model N engine is typical of Continental design and construction, it being a four-cylinder, water-

oil pan. This pan may be quickly removed, leaving the main and connecting rod bearings exposed. The use of pressed steel also eliminates the possibility of core sand working out and being carried with the lubricant to moving parts, which is a possible source of danger unless extreme care is taken. The crankcase is designed to use any standard magneto and several of the well known engine starters and lighting systems, the flywheel periphery being cut with teeth half the width of the face to mesh with the pinion of the motor starter shaft. The motor starter bracket is at the left side and a cover plate is fitted in the flywheel housing over the opening for the shaft and pinion of the starter if this equipment is not installed.

The crankshaft is of high grade material, carefully finished, with front, centre and rear main bearings 2.1875, 2.21876 and 2.25 inches diameter, respectively, and with length of 2.2875, 2.5 and three inches, in the order given, this making a total of 9.375 inches bearing length. The main bearings are babbitt metal in bronze



The Smallest Continental Motor: At Left, the Intake Side; at Centre, the Timing Gears; at Right, the Exhaust Side.

cooled, L head type with cylinder bore of 3.5 inches and stroke of five inches, the cylinders being cast en bloc. The water spaces are large and the block is cast with the head open, this being covered with a plate retained by cap screws. In the centre of the plate is the outlet manifold. The valves are at the right side, the operating mechanism being contained in pockets that are enclosed by plates retained by pairs of wing nuts. The cylinder block and the pistons are very carefully finished.

The upper portion of the crankcase is a casting of aluminum alloy and it is designed with a housing that extends over the flywheel, covering the upper half when engine and clutch are separate. When a unit power plant is required a lower half is provided, the remainder of the housing being bolted to the section over the flywheel. The arms that support the rear of the plant are cast integral with the housing, but the forward support may be an extension of the starting crank housing or lugs cast at either side at the front end. A material saving in weight and a considerable gain in strength is made by the use of a pressed steel

cages. The flywheel is bolted on to a flange forged integral with the crankshaft. The pistons and connecting rods have been designed with a view of reducing weight without sacrificing strength, and a considerable reduction has been made. The pistons are four inches length with walls .09375 inch thickness. The ribs found necessary in longer pistons to reinforce the heads are not required with those used in these motors. Three piston rings, each .09375 inch face, are used. The connecting rods are I section, drop forged from 35 to 45 point carbon steel, and heat treated. These are bored and reamed on special machines to insure the correctness of the centres and perfect alignment. The wristpins are chrome nickel steel, hardened and ground. The big end bearings are 1.875 inches diameter and 2.0975 inches length, of a fine quality of babbitt metal. The bearings are fitted with steel shims by which practically any adjustment may be made. The wristpin ends are bushed with phosphor bronze, 1.09375 inches diameter and 1.5 inches length.

The camshaft is large, having a forward bearing 2.625 inches diameter and 1.4375 inches length, and

bearing 1.5 inches diameter and 1.75 inches length. Inlet and exhaust valves are interchangeable and 1.0625 inches diameter, with nickel steel heads electrically welded to carbon steel stems. Both seats and stems are accurately ground to size and the stem ends hardened to minimize wear from the tappets. The usual means of adjustment for wear are found in the tappets.

As the efficiency of the motor is largely dependent on the **accuracy of the valve timing**, a great deal of attention has been devoted by the Continental engineers to this detail, and the model N valves are timed as follows: Intake, opens 17 degrees 53 minutes late, remains open 192 degrees 32 minutes, closing 29 degrees 25 minutes late; exhaust, opens 42 degrees 36 minutes early, remaining open 230 degrees 56 minutes, closing eight degrees 20 minutes late. The firing order of the cylinders is 1, 3, 4, 2.

The timing gears are helical cut and are practically noiseless in operation. They are housed in a case fully designed for effective lubrication. The motor is lubricated by the well known Continental system—a combination of splash and force feed. The oil is led to the reservoir through an outside filler and filtration is carried to the timing gears, where the flow drains to the pits in the engine base and where it is distributed by splash to the internal moving parts. The volume of oil in the reservoir is shown 1 time by a float operated gauge. The motor is cooled by a thermo-syphon circulation of water through the large cylinder jackets, the radiator, and by being mounted on an adjustable bracket carried on the forward end of the block, driven by belt from a pulley on the forward extension of the magneto shaft.

Though no announcement has as yet been made by the company concerning this engine, a great deal of interest has been aroused by some knowledge that it exists, and this has been productive of innumerable inquiries.

The Electric Storage Battery Company, Philadelphia, Penn., has issued catalogue section "SL", which is descriptive of the type X Exide battery for automobile starting and lighting purposes. This battery is designed to meet the service stated and has unlimited capacity for the weight and volume and construction that insures a clean and dry assembly. Each is a separate sealed unit, and the batteries are made up of three, six, eight and nine cells, affording 2, 16 and 18 volts, and batteries of 12 or more can be furnished in different sizes and assemblies.

The Postal Transfer Service Company, which has been in operation for transportation of mail in New York City, 42nd street south, has established its garage at 42nd avenue and 42nd street. It is a brick building, 100 by 200 feet, with the roof available for storage. The company has about 100 trucks and vans in use, these being divided into day and night runs about equal in numbers.

PATENT NOT INFRINGED.

J. S. Bretz Company Successful in Defense of Suit by Hess-Bright Company.

The suit of the Hess-Bright Manufacturing Company and the Deutsche Waffen und Munitions Fabriken of Germany, against Hedwig Fichtel and Ernst Sachs, engaged in business as Fichtel & Sachs, and the J. S. Bretz Company of New York, begun in 1911, has been decided by Judge McPherson of the United States district court for the eastern district of Pennsylvania, sitting at Philadelphia, and is in effect that the defendants do not infringe upon the rights of the complainants, and a decree was entered dismissing the bill at the cost of the plaintiffs.

The Bretz company is American sales agent for Fichtel & Sachs, and the complaint was founded on alleged infringement of the Conrad patents, so-called, which cover a continuous and uninterrupted race construction of a ball bearing. The Conrad patent is owned by the Deutsche Waffen und Munitions Fabriken, the Hess-Bright Company being its American agent. The decision limits the Conrad patent to a bearing of any kind having no notches inside of either ring for the introduction of the balls, and to a bearing having a limited number of balls, being only such number as may be inserted in the crescent shape formed by eccentrically displacing the rings, and having separators between the balls.

This decision is regarded to be of material importance because numerous concerns, both in Europe and this country, manufacture ball bearings, and until this determination the complainants had successfully protected the rights insured by the Conrad patent. The concerns that are more or less affected by the decision are the M-B, R. I. V., S. K. F., S. R. O., Schaefer, H. C. B., Ideal and Rhineland, made by foreign companies, and the New Departure and the United States, made in America.

According to Alfred H. Bartsch, advertising manager of the Bosch Magneto Company, more than 1,000,000 magnetos are now in use in motor vehicle equipment in America, which statement can be accepted as reasonably conservative. When all other forms of gas engines are considered this total will probably be increased to 2,500,000. The enormous use of the internal combustion motor is not realized until facts of this character are known. Magnetos were not used for vehicle engine ignition to any material degree until 1908, and in six years the use of these instruments has become well nigh universal.

The New England branch of the Kissel Motor Car Company at Boston, Mass., has been placed under the management of Ralph Ketchum, formerly of the R. & L. Company of Boston, who has succeeded H. B. Pruden.

BOSTON'S TRUCK SHOW.

Numerous Applications for Space Already Insure Success of the Exhibit.

Plans are rapidly approaching completion for the third annual motor truck show to take place at Mechanics' building, Boston, Mass., March 17-21, and Manager Chester I. Campbell is very sanguine that the exhibition will be superior from every point of view to any yet held in that city. Boston will be the only large city of the country in which an exhibition of service vehicles will take place this year, and with the keen interest in motorized transportation equipment obtaining generally in New England the management is looking forward to large attendance and increased patronage.

This will be the only opportunity for manufacturers seeking representation in one of the best markets of the country to make exhibition, this form of introduction to prospective agents and the public having a distinct advantage as contrasted with campaigning by sales managers for those interested in agency propositions. This has attracted a considerable number whose vehicles will be seen for the first time, while many of the standard makes of machines of known reputation will be shown. Judging from the spaces engaged and the applications pending there is the best of reason to believe that the show will be the largest of the kind ever seen in Boston, and the number of makes and types of vehicles will no doubt be considerably in excess of any previous exhibition. In fact, it is believed that this show will make records of all kinds.

The use of motor wagons and trucks is increasing very rapidly in New England. The coming season is expected to be the best ever known from every point of view, and the show will undoubtedly attract thousands of interested visitors. Last year many business firms considering motor vehicle equipment had their engineers systematically examine the types of machines shown that were suited to requirements, and reports made resulted in a considerable number of sales. Comparisons of distinct value could not be made outside of an exhibition save at large expense. While the display of accessories will be secondary and will be naturally confined to what can be utilized with power wagons, this division will be of material interest and will include a considerable number of interesting exhibits.

Merchandise creditors of the Brown Commercial Car Company, Peru, Ind., now conducted by William B. McClintic as receiver, and against which bankruptcy proceedings were recently instituted, are desirous that Mr. McClintic be continued as trustee. These interests are favorable to any proposition that will permit the reorganization of the company or continuing it as a going concern.

VEHICLE OWNERS RESIST UNIONS.

Indianapolis Employers Unite for Defense Against Demands of Employees.

During the recent strike of street railway employees at Indianapolis, Ind., which was resultant from an endeavor to unionize the vehicle drivers of that city, the Employers' Association was instrumental in the formation of the Commercial Vehicle Protective Association by practically all the concerns of the city employing drivers. This organization raised funds, established headquarters, and an executive committee directed the activities, police authority being conferred on drivers who wished to work, while a force of 500 citizens, all armed and 100 of them mounted, supplemented the work of the police department.

Attention was then directed toward moving highway vehicles with the result that in four days conditions were practically normal, and the great majority of the firms were ready to operate with their regular drivers. The number of men who refused to work until the union had been recognized was comparatively small. There was but slight retardation of business and some firms suffered no loss through the delays incident to the strike. The strike has not been officially terminated, but the union members have been advised to seek employment, to make verbal agreement as to wages and to obtain permission to wear the union button, but recognition of the union is not sought for. Employers who are members of the Commercial Vehicle Protective Association are generally refusing employment to union men on the ground that they would agitate unionism among non-union employees.

The principal result of the strike, so far as the city is concerned, has been the unification of the business interests for protection against not only labor domination, but the general preservation of the rights of the people. The Employers' Association is being reorganized on broader lines, and endeavor will be made to maintain the "open shop" policy in all industries of the city.

The Los Angeles Brewing Company, Los Angeles, Cal., has purchased seven White machines, one of 3000 pounds, three of 6000 pounds and three of 10,000 pounds capacity. These are to be fitted with stake bodies and will be used for brewery service. When these shall be delivered the company's equipment will be completely motorized. The purchase was made after the company had made experiments with motor vehicles for several months.

George Uehlien, president of the Universal Motor Truck Company, Detroit, has purchased the interests of F. K. Parke in that corporation and Mr. Parke has retired as general manager and from participation in the activities of the concern.

"SILVER ANNIVERSARY" BOOK.

The Building of an Industry" is the title of a publication produced by the Electric Storage Battery Company, Philadelphia, Penn., for private distribution which deals with the history of the company from its inception in 1888, a period of 25 years. Beginning with the arrival of Clement Payen in this country in 1887, and following the acquisition of his interest by Philadelphians, the subsequent formation of the Electric Storage Battery Company in 1888 and the beginning of the manufacture of the "Chloride Accumulator" at Gloucester, N. J., the story is told in chronological form, the first describing "The History", the second "The Product", the third "The Factory" and the fourth "The Organization".

Beginning with five men the company has increased until it is one of the best known and one of the most substantial industries of the country, with a factory in Philadelphia that occupies 23 separate buildings and has 12.25 acres of space, and its branches, sales and representatives can be found in hundreds of cities. The development of the company industrially is intensely interesting, but it is paralleled by the adaptation of storage batteries to innumerable purposes. A description of the manufacture of cells is necessarily omitted, but some of the processes are outlined, and mention is made of the promotion of the welfare of the workers in the factory. The names of the officers, directors, department heads, engineers and sales men are included in "The Organization". The book is carefully designed, illustrated and printed, and each page is bordered with a heavy rule of silver, symbolical of silver anniversary of the company, and as a publication is exceptionally attractive. It is a decided treat to the publisher.

With a view of locating a branch factory representatives of the Continental Motor Truck Company Denver, Col., have examined sites at Waterloo, Ia., and several other cities.

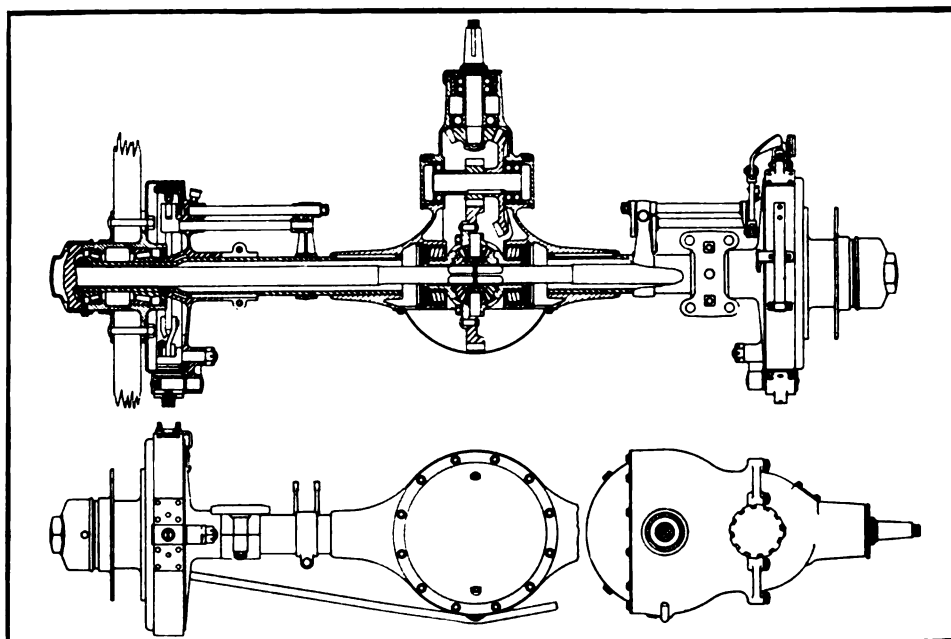
The Akron Airless Tire Company has been organized at Akron, O., for the purpose of manufacturing a tire core that will be adapted for use with pneumatic shoes on service wagons.

Chicago capitalists propose to establish a motor bus service in Michigan and Jackson boulevards and Meridian road in that city.

WESTON-MOTT AXLE.

Full Floating Type for Use in Vehicles of Capacities to 2000 Pounds.

The Weston-Mott Company, Flint, Mich., is now producing a rear axle that is designed for use with either gasoline or electric vehicles and so constructed that the frictional losses are minimized. The axle is a full floating type and is thus far made in two sizes, which are designated as types 970-L-D and 990-L-D, the former for use on machines having 1500 pounds capacity and the latter for vehicles having 2000 pounds capacity. This axle is shaft driven and it is built with a reduction gear in combination with the differential so that it may be coupled to the main driving shaft and in this unit reductions of from 5:1 to 10:1 obtained, this being far greater than could be obtained with the single bevel gear without making the gear



The Full Floating Rear Axle, Adapted for Either Gasoline or Electric Machines, Made by the Weston-Mott Company, Flint, Mich.

of a size that would be impractical for use because of the extreme diameter of the axle housing and the very small road clearance, to say nothing of the materially increased cost of production and necessarily larger selling price.

The axle housing consists of a centre section with a cap that is practically the full diameter. This cap when removed exposes the entire back of the differential assembly. Into the arms of this housing the shaft housings are fitted, and the outer ends of these carry sleeves that support the spring seats and the brake flanges. The brake shaft brackets are mounted on the axle shaft housings. Forward of the differential assembly the housing is divided transversely and at this division is mounted the cross shaft of the reduction gear, and the forward section carries a pinion shaft that is supported by ball bearings, the forward being a double thrust bearing and the rear a single

bearing. The cross shaft carries at the right a bevel gear that meshes with the pinion of the pinion shaft, and a spur pinion that meshes with the spur gear of the differential, and this shaft is also mounted with a double ball thrust bearing at the right and a single ball bearing at the left. The differential assembly is installed on roller bearings.

The ends of the axle shafts are fitted with dog clutches fitted into the wheel flanges and the wheels are mounted on Timken roller bearings. The entire axle assembly is enclosed in an oil tight housing and its operation should be practically noiseless. The bearings have been selected with a view of affording maximum efficiency and endurance, and the materials have been determined with the purpose of securing maximum strength and minimum weight. The shafts and gears are made of an alloy steel that is carefully heat treated, and the axle housing is a special material that will endure under the use expected of a vehicle driven

BAKER FOUR-TON DUMPING TRUCK.

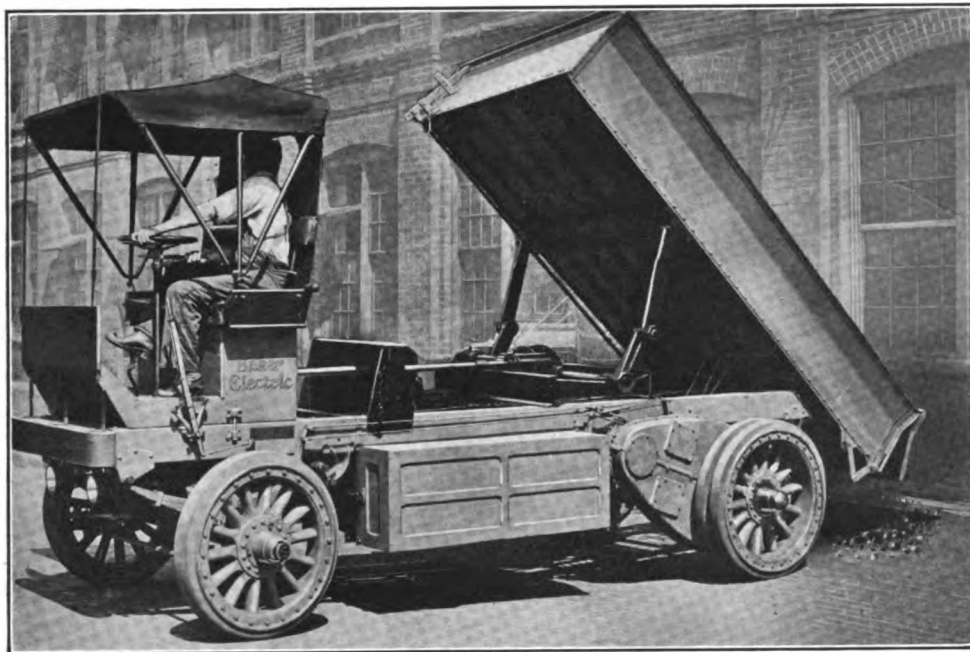
Standard Electric Chassis Equipped with Power Discharging Body.

A quick discharging body that can be operated by hand or motor has been designed for use with the standard four-ton truck chassis built by the Baker Motor Vehicle Company, Cleveland, O., and the equipment can be installed at the option of any purchaser. The body is constructed for endurance, having a frame of angle iron with sides and ends of steel plates, these members being riveted. The floor is built of steel channels securely riveted, these being covered with a steel plate that forms the floor. The tail gate is opened and closed by a lever mounted at the side of the seat of the driver.

The body can be elevated to an angle of 45 degrees,

and is hoisted by means of two arms secured to the sides of the body below the floor. These arms are actuated by a large steel cross shaft that is installed transverse of the chassis frame, and revolves in one direction only. Two-thirds of one revolution is required to elevate the body to its greatest height, and the other third revolution of the shaft will lower the body to its seat on the chassis frame. Naturally the body may be lowered in half the time required to raise it, the entire dumping operation requiring 50 seconds.

As will be noted from the accompanying illustration the body is hoisted by a shaft extending longitudinally of the chassis that carries a worm that



Four-Ton Baker Electric Truck Fitted with a Steel Body, with Either Hand or Power Hoisting Apparatus.

on solid tires. The axle is fitted with a truss rod to insure against sag. When used with an electric vehicle the motor shaft may be coupled with the pinion shaft, and when used with a gasoline machine the driving shaft may be coupled with the pinion shaft. The statement is made by the manufacturer that the construction is such that the axle may be used without radius rods, it having sufficient strength to endure the stresses of constant service under severe working conditions.

A quarterly dividend at the rate of seven per cent. annually was ordered by the Packard Motor Car Company, payable to all holders of preferred stock of record as of Dec. 3, on and after Dec. 15. This is the usual rate of dividends that has been paid by this company on its preferred stock during the last several years.

meshes with a worm wheel, which in turn drives a train of reduction gears that actuate the cross shaft. The shaft is amply lubricated, the bearings being in oil tight housings. The shaft may be driven by an auxiliary motor supplied with power from the battery, or it may be turned by hand.

The sizes of standard bodies for handling fuel and construction material are as follows: Coke, 11 and 14 feet length, four and six feet width, and three feet height; coal, 10 and 14 feet length, four and 4.5 feet width, 1.5 and two feet height; sand, 10 and 14 feet length, four feet width, one foot and 1.5 feet height, the last dimension including three-inch flareboards.

The New Departure Manufacturing Company, Bristol, Conn., maker of ball bearings and differing specialties used in motor vehicle construction and equipment, has added \$500,000 to its capital.

PHILADELPHIA SECTION, E. V. A. PROMOTING ELECTRIC HAULAGE.

Fourth Division of the Organization Formed in the Quaker City.

The fourth division or group of the Electric Vehicle Association of America was organized at Philadelphia, Dec. 15, this body being the development of the interest created in connection with the annual convention at Chicago last October. The preliminaries had been provided for and when these had been completed the formalities took place. The body will be known as the Philadelphia section, and it will have the same scope of the New York, Chicago and New England sections, conducting its own activities and participating in the general promotive work of the national association.

The following officers were elected: Chairman, R. L. Lloyd, Philadelphia Electric Company; vice chairman, A. W. Young, Public Service Corporation, Camden, N. J.; secretary and treasurer, J. C. Bartlett; directors, W. H. Johnson, Philadelphia Electric Company; E. P. Whitney, Commercial Truck Company of America; Frank B. Neely, Electric Storage Battery Company; James M. Skinner, Philadelphia Storage Battery Company; Carroll A. Haynes. Mr. Lloyd, by his election as chairman of the section, becomes the fourth vice president of the Electric Vehicle Association of America.

A KisselKar truck owned by the John Irwin Wholesale Grocery Company, Calgary, Alberta, has been used by that concern for a year, being operated through parts of two winters and in conditions that are unusually severe, because of the frequent thaws that transform the roads into rivers of deep mud, without the loss of a day's time. Another truck owned by the Great Western Liquor Company of the same city has been used nine months without repair and no road delay has been experienced.

The Bridgeport Auto Company, recently organized at Bridgeport, O., is to build a general line of vehicle, motor boat and aeroplane engines. A factory is shortly to be erected. The company may be merged with an eastern company now engaged in building vehicles.

A building 100 by 30 feet has been built by the Western Motors Company at Sacramento, Cal., work begun on another structure 100 by 200 feet. It is expected that several other units will be added to the plant, which will produce delivery wagons and trucks.

An ordinance introduced by Alderman W. C. ... requiring that all service wagons and trucks in that city be equipped with fenders, is pending before the city council of Milwaukee, Wis.

New England Section, E. V. A. of A., Starting Campaign in Bay State Cities.

The New England section of the Electric Vehicle Association of America has begun a campaign to generally stimulate the interest of the people generally in electric cars and service wagons, and to this end purposes to hold at different times public meetings in cities throughout New England. In this work the members of the section will endeavor to interest local trade organizations, and all will unite in general promotion, expecting, of course, that the central station company of the city or town will co-operate and follow up the campaign by such methods as appear to be promising.

The meetings of the section are usually held in Boston, the members coming from the towns and cities in New England and having the opportunity of listening to speakers of recognized ability, who are generally specialists in transportation efficiency. Naturally, so far as may be, the speakers discuss electric vehicle service.

The January meeting of the section, however, will be held at Salem Jan. 15, and to arouse the interest of the people there will be a parade of passenger cars and service wagons through the streets of Salem, Beverly and Peabody, the start to be made at 3 o'clock. At 6 o'clock the members of the section and others who may join them will have dinner at the Salem Club. Beginning at 7:30 there will be a parade of illuminated vehicles through the business district of Salem, and at 8 o'clock a public meeting will be held at Board of Trade hall, to which the public is invited. The speakers will include Harry F. Thomson of the Research Department of the Massachusetts Institute of Technology, men who are engaged in the sale of electric passenger cars and service wagons, and Frank J. Stone and George W. Holden, who represent battery manufacturers.

Manager S. Fred Smith of the Salem Electric Lighting Company has planned to entertain the central station representatives, and all out of town owners who desire to have their vehicles participate in the parades will have free current and garaging by application to the company's garage.

A department will be given over to the exhibition of automobile vehicles to be made in Pittsburg, Penn., Feb. 14-21, under the auspices of the Pittsburg Auto Show Association. Space has been assigned to exhibitors of 72 different makes of machines. The display will be made in Exposition hall, which is a permanent structure in the centre of the city, having ample space for every purpose required.

Purchasers of Stegeman trucks will from now on have option of chain cases, as the machines will be built with open and enclosed chains as may be desired.

ELECTRIC BREWERY WAGONS.

Special Body Equipment Designed by the Baker Motor Vehicle Company.

For the use of brewers who require light delivery wagons for the distribution of bottled products in small towns and the residential sections of cities a special body has been produced by the Baker Motor Vehicle Company which, while primarily intended for installation on a 3000-pound standard electric chassis, can be built for use with 2.5 or four-ton machines, the bodies differing only with reference to dimensions. The design is a full enclosed type with a roof extension even with the dash, and panels at the sides of the driver's seat, in which are large windows.

For the 3000-pound wagon the body is built with loading space 106 inches length, 46 inches width and 60 inches height, in which 54 24-bottle racks can be placed. At either side is a sliding door half the length of the body, but the rear end is closed. The doors slide on rollers on overhead tracks, which insures against obstruction of movement, and each is secured by a spring lock that requires a key to open when closed. The arrangement of the doors is such that the driver can remove any part of the load without moving the cases. As the filled cases are removed and empty crates loaded there is convenient access to the load at all times. The floor is inclined toward the centre to insure against the cases sliding against and preventing the convenient movement of the doors. Loading and unloading can be done very quickly with these bodies.

The Erie Brewing Company, Erie, Penn., was the first to use this type body and it has given much satisfaction, being extremely serviceable from every point of view. During a blizzard in Erie in November this company's machines made regular deliveries when other machines and animals were not worked. The

electric machines have not been out of service a day since use was begun nearly a year ago, and have been found to be very economical.

The body designed for the 2.5-ton chassis will carry 90 24-bottle crates, and the four-ton body will carry 145 cases. Besides this form of body the company builds the equipment that is recognized as standard for brewery service, for either keg or barrel delivery.

BOOMING THE LINCOLN HIGHWAY.

The promotion of the Lincoln national highway will be systematically done the present year by 26 different publications devoted wholly or in part to motor-ing, to the motor vehicle industry, the trade or to highway haulage. Each of these prints will publish gratuitously during the year advertising that will aggregate six full pages, making appeal for funds for general construction purposes. The advertising copy will be written by men of national reputation among advertisers, who will contribute their services to the cause.

The advertising will appear in the different issues of the magazines, according to the judgment of the men who will prepare it, and it will be especially interesting from the fact that the projectors of this concerted publicity hope to be able to secure subscriptions to a total of \$200,000 during the year. The funds will be sent to the Lincoln Highway Association. The magazines are located in all parts of the United States and Canada, and the MOTOR TRUCK, Automobile Journal and the Accessory and Garage Journal are included in the list.

"OIL TOPPINGS" WELL TESTED.

The value of "oil toppings" as a motor fuel was well demonstrated at the recent Los Angeles, Cal., motor truck exposition, when a KisselKar truck motor was run practically continuously for 128 hours, the engine being stopped twice for a few seconds. The motor was driven at what corresponded to 20 miles an hour and to a total mileage of 2560, and when the spark plugs were removed some encrusted carbon was found on them, but no soft or spongy deposit. During the test a new carburetor, made at Los Angeles, was used, and the result was official verification of the trial of the same fuel during which a KisselKar truck was driven from Los Angeles to San Francisco, a distance of 472 miles, for an expense of less than \$1.40. Oil toppings is sold at three cents a gallon.



Special Body Designed for Carrying Cases of Bottled Beer for Installation of Baker Electric Wagons and Trucks.

ONE RECEIVER FOR POPE COMPANY.

Col. George Pope is serving as the sole receiver of the Pope Manufacturing Company in Connecticut, this being the result of a decision by Judge Case of the superior court on the petition heard by him at Hartford, Conn., brought by Boston stockholders, who sought to secure the appointment of Charles A. Morse and Charles A. Persons of that city as co-receivers. Col. Pope was originally appointed and later the petition was introduced as the result of a meeting of Massachusetts interests. Immediately after this determination manufacturing was resumed and the activities of the company planned.

ANNUAL CHRISTMAS TREE.

Santa Claus made his annual visitation to the members of the Electric Motor Car Club of Boston at a meeting of that organization at the Hotel Thorndike Dec. 22, L. R. Vredenberg assuming the role of St. Nick. Each member received a filled stocking from a reindeer, and the gifts were selected especially for the recipients. The occasion was extremely pleasureable.

M. & A. M. OFFICERS RE-ELECTED.

The Motor & Accessory Manufacturers, at the 11th annual meeting at New York City, Jan. 7, re-elected J. H. Foster of the Hydraulic Pressed Steel Company, E. Raymond of the B. F. Goodrich Company, T. J. Hazel of the Spicer Manufacturing Company and C. Stiger of the Stromberg Motor Devices Company officers for three years, and received the reports of president, treasurer and the chairmen of committees. At a meeting of the directors held the following day these officers were chosen to serve for one year: president, J. H. Foster, Hydraulic Pressed Steel Co.; vice president, F. Hallett Lovell, Jr., Lovell-McNeill Manufacturing Company; second vice president, C. E. Whitney, Whitney Manufacturing Company; third vice president, F. C. Kings, Billings & Spencer Company; treasurer, L. M. Newright, Diamond Chain & Manufacturing Company; secretary and assistant treasurer, Ed P. Sloan, Jr., Hyatt Roll-bearing Company. William Sweet was continued as manager of the association and following were elected to membership: Couder, Paeschke & Company, Milwaukee; American Sheet & Tinplate Company, Pittsburgh, Pa., and Champion Machine Working Company, Cleveland, O.

TESTED IN A BLIZZARD.**Pierce-Arrow Truck Operated in Snow That Tied Up Cleveland, O., Traffic.**

A Pierce-Arrow five-ton truck was demonstrated during the blizzard that blockaded the streets of Cleveland, O., for several days, caused property damage to the amount of at least a million dollars, blockaded railroad and trolley traffic, and so greatly diminished the supply of food that only by heroic work were the people saved from actual hunger. The demonstration had been arranged by the Cleveland agent for the machine, who engaged to haul coal for the Zittlemeier Coal Company, and the Monday morning the work was to begin Old Boreas had deposited enough snow in the streets to practically cause a cessation of traffic. The storm continued for three days more and when the snow fall had ceased there was 22 inches depth, while in places drifts were five and six feet in height.

The truck was driven by a driver who was not thoroughly experienced, and it was worked continuously from Monday morning until Wednesday afternoon with a stop from 3 to 5 Tuesday morning and another from 3 to 7 Wednesday morning, carrying coal. The truck was loaded to capacity and it plowed through the streets with freights that could not have been moved with any other conveyance. The coal company tried to use four and six-horse teams on its carts and was forced to abandon the delivery, but the machine, which was fitted with a dumping body and hydraulic hoist, was required to deliver practically all the fuel that was sent out during the period it was worked. The motor was kept running continuously during the time the machine was in service.

The difficulty of securing traction may be judged from the fact that the truck used more than 60 feet of tire chains during the three days, the links breaking and necessitating renewal at frequent intervals.



Five-Ton Pierce-Arrow Truck with Hydraulic Hoist and Dumping Body That Was Demonstrated in a Blizzard at Cleveland, O.

"MOTOR TRUCKS OF AMERICA".

A wealth of up-to-the-minute and dependable information on the general subject of motor service vehicles is contained in the "Motor Trucks of America", volume two, which is now ready for distribution by the B. F. Goodrich Company, Akron, O. Those who own or use trucks, or are investigating transportation with motor vehicles, will find that this book has unusual value. The first volume was published a year ago, and so large was the demand that the company decided to issue a similar book annually.

Volume two includes illustrations and the specifications of more than 90 trucks built in the United States, the data and photographs being furnished by manufacturers who are stated to represent approximately 92 per cent. of the production of the motor truck industry. The information is accurate and complete, representing every essential detail.

The book is well designed and printed and contains 112 pages. It is cross-indexed and in addition to the data stated it contains a reprint of "Efficiency in Buying and Operating Motor Trucks", which was written for the Review of Reviews by W. J. McDermid. Incidentally it deals with Goodrich truck and wagon tires, giving facts of these that are desirable to know. The book may be obtained at request made to the B. F. Goodrich Company, truck tire department, Akron, O.

FALL RIVER ENFORCING STATUTE.

The board of police commissioners of Fall River, Mass., has been requested by the city council to take whatever action may appear expedient to prevent the use of large motor vehicles on the streets of the city in violation of the provisions of the law enacted at the last session of the Massachusetts general assembly. This law limits the weight of traction engines, trailers, motor or other vehicles to 14 tons unless a special permit is obtained, prohibits the use of clamps, cleats or flanges on rims or tires of wheels; prohibits the weight of a vehicle exceeding 800 pounds per inch of tire width; limits the speed of a vehicle weighing with load in excess of four tons to 15 miles an hour; limits the speed of a vehicle weighing with load in excess of six tons to 12 miles an hour with rubber tires, or six miles an hour with metal tires; and provides that permits may be general or for specified highways, or for a limited period.

The LaCrosse Motor Truck Company, LaCrosse, Wis., has elected the following officers: President, Frederick Noetzel; vice president, Herbert Lewis; secretary-treasurer, W. F. Ristow.

The Auto Tractor Company, Niles, Mich., is to erect a factory in that town that will be one story and 250 by 90 feet. Construction is to be begun immediately.

TRANSPORTATION EFFICIENCY.

The December meeting of the New England section, Electric Vehicle Association of America, was held at the Edison auditorium at 39 Boylston street the evening of the 18th, at which time an address was made by Charles F. Smith, superintendent of the garage of the Edison Electric Illuminating Company of Boston. This garage is used for housing both electric and gasoline machines and is one of the finest in the world. Mr. Smith described the service station of the company and its equipment and the system governing the transportation department, which has been the development of years of experience. Efficiency is the primary object, both in the garage and in the operation of the vehicles, and the explanation of the results obtained by careful organization was decidedly interesting. The address was illustrated by stereopticon views. President J. A. Hunnewell of Lowell presided at the meeting.

The H. W. Johns-Manville Company of New York City has entered into an agreement with the Carter Carburetor Company, St. Louis, Mo., maker of the Carter multiple-jet carburetor, to exclusively market the products of the Carter company through its branches and selling agents throughout the country. The Johns-Manville Company will, during the coming 60 or 90 days, establish service stations at all its branches where users of Carter carburetors can receive whatever attention is desired by them. Hugh H. C. Weed, vice president of the Carter Carburetor Company, will be associated with the Johns-Manville Company as manager of the carburetor department, and will be located at the branch of the company at Madison avenue and 41st street, New York City.

Cortland F. Ames, for a considerable length of time distributor of Sewell cushion wheels at Chicago, Ill., has associated himself with the Devine Tire Company of that city as sales manager. The Devine tire is constructed of cotton duck and large claims are made by the maker for its endurance and service in all working conditions.

The non-resident owners of service wagons that are driven into Illinois from other states, have been required to take out registration and driving licenses in that state. The laws relative to registration and operation are being rigidly enforced.

J. M. Bray has been named service engineer of the Atterbury Motor Car Company of Buffalo, N. Y. He was until recently connected with the Continental Motor Manufacturing Company, Detroit, Mich.

The articles of incorporation of the Otto Armleder Company, Cincinnati, O., have been amended so that the company can engage in the manufacture of motor wagons and trucks.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., FEBRUARY, 1914

No. 2

PRACTICAL MOTOR TRUCK ECONOMIES.

**Combination Service of Machines for Long and Heavy Haulage and Animals for Short Hauls and Route Deliveries Highly Satisfactory in Creamery Distribution--
Facilities and Methods Developed by Four Years' Experience.**

INCREASED efficiency and resultant economy will undoubtedly receive consideration from business men, and yet the experience has been that the majority of those owning or managing enterprises will continue a condition rather than make a change that cannot definitely be established so far as results are concerned. With reference to highway transportation, while most executives realize the possibilities, they are not willing to devote the time and attention necessary to development of them.

The fact that relative efficiency can be obtained with animal and motor equipment does not appear to be generally understood. By this is meant that quick loading and unloading, facilities for handling loads, and organization and system will be as productive with the one as with the other. The motor vehicle has usually greater speed and carrying capacity, and its utility is unchanging, while the service of the animal is limited in many ways. But as a rule not until the motor vehicles are used is there any disposition to develop productivity.

Many owners, considering propositions for economizing haulage expense, regard the proposal too broadly, and instead of adapting the equipment, using motors where these would be worked to greatest advantage, and continuing the service of horses in the event of doubt as to results, reject the subject without understanding possibilities. Where a service is reasonably constant the more definite information is obtainable, but even when extremely variable sufficiently accurate facts can be determined.

Motor Trucks and Horses.

The most practical method would appear to be the utilization of motor wagons or trucks wherever these could be used with reasonable assurance of profit

and the use of animals for such work as appeared questionable with reference to economy. That is, a part of a transportation equipment might be motorized, and by observation and record the possibilities with the animal vehicles determined by results in comparative operation.

Many concerns of large proportions are carefully ex-



Plant of the Maine Creamery Company, with Wide Drive to Stable and Garage and Loading Platform Serving for a Dozen Vehicles at the Side of the Building.

perimenting, using differing types of motor vehicles in comparison with horses. Others have combination equipment that has been found satisfactorily economical. Careful deduction from data covering periods of considerable length has established that where this form of service has been in use the efficiency is reasonably good. There are two conditions that may be met with—the continuance of methods adapted from custom with the horse, and a tendency to overload the motor vehicles because they can be made to carry overloads. Men who would not tolerate working a horse excessively will seldom hesitate to load whatever they believe they can carry, even with a strong probability of damage.

Important Factors.

Without considering instances that may be regarded as the exception and not the rule, the possibilities of working horse and motor wagons under the same administration have been productive of satisfactory efficiency. Where the executive that directed the animal service is continued in charge of the motors there is probability that results with this type of vehicle will increase with experience. To expect extreme economy with limited knowledge would not be reasonable.

There are objections to combining garages and stables, and separate establishments might be regarded as expensive. One stable or one garage would appear to be the ideal, but conditions are not often such that the two could be united save where special provision has been made to insure against fire, such as the division of a building by a heavy wall, or the use of two buildings a sufficient distance apart as would minimize danger.

Maine Creamery Company.

The transportation service of the Maine Creamery Company, Providence, R. I., is an instance of utilization of motor and animal vehicles in combination, the machines taking the place of horse equipment in suburban distribution, that is worthy of special inter-

est. For one class of work the animals are believed to be more economical than the motor vehicles, while in other classes the machines are productive of saving. The possibilities of business expansion are also especially attractive, and it is the purpose of the company to serve a considerable area of new territory the coming spring that would not be possible with horse service. Not only this, the company can give the customers it will develop quite as good attention as those within a very short distance of the office and plant.

The company's plant is at 69 Broadway and it is equipped with every facility for production, and the increase of production through the expansion of business means a realization of lower manufacturing cost, and consequently a greater profit than would be apparent if transportation only were considered. As a matter of fact the nearer to continuous operation during working days that is practical the larger the economy, and as the demand for products varies with the season the desirability of production efficiency and the lowest investment that is consistent with this are evident enough. The company deals extensively in sweet cream, which is supplied in bottles to retail establishments and quantity consumers, and in addition to this manufactured about 200,000 gallons of ice cream last year. This output will undoubtedly be considerably increased the present season.

Production and Distribution.

The production is lowest during the winter months and largest in the summer, gradually increasing from minimum at this season to maximum through June, July and August, then decreasing gradually. During December, January and February the demand is comparatively small, but as the temperature rises the consumption is such that the plant is operated until midnight in extremely hot weather. This statement is made to emphasize the extremes of demand, while of course the usual changes of temperature will considerably influence requirements for distribution.

The company maintains a plant in North Provi-



The Motor Equipment of the Maine Creamery Company, Providence, R. I., Manufacturer of Cream and Ice Cream, Used for Distribution. Installation Will Probably Be Increased and Business Expanded.

ence, about four miles distant, where it cuts and stores ice each winter, having a privilege at a large pond and an ice house with a stable and the usual facilities. The daily consumption ranges from five tons in winter to 10 tons in summer, with occasional demands in excess of these figures in the event of unusual conditions. The ice harvest is ordinarily considerably in excess of the requirement, when cutting is possible, and the intention is throughout the year to haul this ice. The company will install this winter an ice making apparatus with capacity of 30 tons daily, which will be available in the event of a shortage of ice, and which will be operated in connection with its cold storage installation at the creamery, but ice will be cut at the pond to the maximum storage limit, and the artificial ice will be marketed when not needed. Artificially made ice is not as satisfactory for ice cream packing as that naturally frozen, and while the freezing plant will insure against the high prices of a short harvest and protects the company, the haulage from the ice houses will be continued and the tonnage will probably be increased rather than decreased.

The business was established a number of years ago and has steadily increased, the distribution of sweet cream and ice cream being in a section about 25 miles in length, extending north from Providence about eight miles, south on the east side of Narragansett Bay for 16 miles, and southwest on the west side for about 12 miles. The population served is somewhat in excess of 400,000. North of Providence, in the cities of Pawtucket and Central Falls, and in the towns of Cumberland and Lincoln are approximately 100,000 inhabitants, and on the east side the towns of East Providence, Barrington, Warren and Bristol have about 35,000 residents. The other sections reached, the city of Cranston and the towns of Warwick and West Warwick, have perhaps 40,000. Roughly speaking 40 per cent of the population is outside of Providence.

The cream and the ice cream customers are not usually served by the same vehicles, the cream being distributed by one series of vehicles and the ice cream

by others, though perhaps two deliveries may be made to the same place. The reasons for this are that the means for cooling are entirely different, and the cream delivered to grocers, markets, etc., is required for family use.

Early Experimentation.

The company four years ago purchased two two-ton trucks, the intention being to use one of these for ice haulage and the other for the distribution of ice cream in the section north of Providence. The results were not satisfactory for several reasons. One was that the machines were more or less experimental and another that the necessity of sending to the factory in the event of a part renewal necessitated costly loss of service. That the maker did not maintain a service station was no doubt justified by the conditions, but unless spare parts were stocked special work at considerable expense was entailed. The trucks were utilized so far as was possible, but the expense of operating was found to be considerably in excess of what had been estimated. Despite the failure and expense they were found to have utility that prompted careful inquiry, and after two years' service a definite plan was decided on.

In this two years a system of distribution was planned that has since been developed, an organization of operation and maintenance decided on, and provision made for facilities for the housing of the equipment that was contemplated. This all entered into the general project for business expansion.

The expectation was when the original trucks were purchased that these would afford service for several years, but with the intention of reducing the horse equipment the sale of these machines was decided on. In January, 1912, the first three-ton Packard truck was ordered, the chassis only being purchased, and within a period of two months two others were bought. The intention then was to utilize one of these for ice haulage and general work that might be practical aside from this, the second to give a daily service to the section north of Providence, and the third to be operated on either side of Narragansett Bay, south of



Using Its Products Within a Radius of 16 Miles Outside of the City and for Haulage of Ice from a Suburban Storage—This Plan Developed in a New Section the Coming Spring.

Providence, motorizing the long hauls.

The requirements of the business were very well understood, and the selection of units of this size was made after careful consideration. The chassis were fitted with platform bodies with sideboards and stakes so that in the event of need the sides could be removed. The sides were fitted with removable panels that could be lifted out when desired, so that side or rear end loading was equally practicable. The decks of the bodies are of two-inch oak plank, with the seams filled with white lead, with copper gutters fitted at either side and drains that carry the water from the ice meltage clear of the chassis at the forward and rear ends of the platforms.

The Body Equipment.

The fittings of each machine, so far as the bodies were concerned, were identical, so that any one could be used for any work in distributing and ice haulage, so that should one be out of service another could be utilized. This provided for any exigency that might

was delivered early in February of last year. The body on this chassis is an express type with a standing top with grating sides and rear doors, so that it may be loaded with the greatest convenience, and this body has a floor in which the drainage is at the rear. Either box is utilized as in larger machines or the ice cream is carried in cans in large tubs packed in salt and ice, so that provision must be made for carrying off the meltage.

How They Are Operated.

In the operation of these machines, assuming a period when maximum requirements exist, one truck is loaded at the plant and driven to Pawtucket, where distribution is begun. Under such circumstances the truck will put out 250 gallons of ice cream daily. At the same time two single-horse wagons are also loaded with ice cream and driven to Pawtucket, these having similar equipment, but smaller, than the truck. They are accompanied by a single-horse wagon with a load of sweet cream. From the truck the large deliveries are made and the principal customers are supplied direct, but the wagons make deliveries of the smaller orders. Should the wagon need additional stock they are replenished from the truck, which is known to be at definite locations at stated times, and should there by any reason for delivering in excess of what is carried by the three the truck is driven back to the plant and a sufficient quantity obtained. While the truck is obtaining fresh stock the wagons continue to deliver. Normally the truck is expected to have a sufficient supply. Manager Harry F. Hardy says that as the distribution is planned for this section the



Two-Ton Packard Machine with Special Body Adapted for Side and Rear Loading, Used for Longest Hauls, Where Quick Work Is Essential.

be anticipated. Two of these trucks were fitted with boxes, the one carried forward in the body and the other carried at the rear, these being separated by a space about two feet width. In regular service the forward box is filled with heavy round cans in which the ice cream in brick form in paper boxes is packed, and the spaces between the cans packed with ice and salt. In the space between the two boxes is carried two barrels containing salt, and the rear box is filled with crushed ice, the ice and salt packing of the ice cream box being replenished as occasion requires. The meltage from the forward box contains a considerable quantity of salt, and this is drained into the gutters of the decks of the bodies and carried off into the highway. This salt would naturally cause erosion of the metal in the event it was not protected. For this reason the gutters are constructed in the bodies.

The fourth machine ordered was a two-ton Packard, this being fitted with a different type body. This

truck is as good as a branch, while customers can be given attention equal to those served direct from the plant. The truck is worked in this manner for about nine months of the year, and during the remaining three months it is overhauled and then used in the stead of the other machines during overhauling.

The second truck is used in delivery Monday, Wednesday and Friday of each week in East Providence, Barrington, Warren and Bristol, and Tuesday, Thursday and Saturday in the city of Cranston and the Pawtucket valley sections of Warwick and West Warwick, and because of the intervals between the trips the deliveries are generally larger than they are at Pawtucket. This machine carries heavy loads and it is not accompanied by horse wagons.

The third truck is used in haulage from the ice house at North Providence, making an average of eight trips daily and often nine during the hot weather, and if necessary some overtime may be necessary to

keep the supply up to the needs of the distribution.

The two-ton machine is used for all manner of work, being sent out on the Bristol and the Pawtuxet routes in the event of shortages and when the weather is extremely warm, and it is sent with all large special orders. The body equipment does not permit the use of the boxes, but the load is usually packed in tubs and a considerable stock can be handled with it. In addition to this the company makes use of a Cadillac pleasure car chassis fitted with an express body. The machine was used in 1910 as a passenger car, and the following year was converted and since that time has been used for making special trips and the delivery of orders up to its capacity. Besides this it serves to carry men about when necessary and is utilized as an emergency wagon by the mechanic in charge of the garage. The Cadillac has been driven upwards of 40,000 miles and is apparently enduring well. It will do the work of half a dozen horses because of its speed and utility.

The Horse Equipment.

Besides the machines the company uses about 20 horses, these being used practically on all of the regular routes in Providence, but they are seldom worked in teams, because of the trucks. But one horse has been bought in two years, and the number has been somewhat reduced in that time, for the business has increased and the machines have taken care of this.

Before the trucks were bought horse teams were used and of course the number necessary for the routes varied with the work, but usually the animals were kept the year round. If horses were purchased in the spring they would show the effect of the hard work during the season and would shrink badly in price if offered for sale, and they could be brought back by easy work into condition for the following year. In some instances horses were turned over to concerns that kept and worked them during the winter, but this was not satisfactory, for those using them generally failed to give them the care they ought to have to preserve their usefulness. The cost of keeping the horses during the winter was considerable and they were practically worked only sufficiently to exercise them.

The out-of-town routes were all hard on horses during the busy season, for it was necessary to use those making Bristol and the Pawtuxet Valley routes alternate days, the trips being from 35 to 40 miles, and rest every other day was imperative. In the ice haulage a four-horse team hauled six tons, making two round trips of eight miles daily, and in addition horses were hired for this work each summer, for the consumption of ice was largely in excess of the 12 tons hauled by the team. At that time the driver started from the ice house at 4, having to rise at 3 to feed his team, and he had a long day when he put up at the ice house stable for the night. During the summer one truck is kept at the ice house and the driver, starting at 5:30, can make eight or nine trips, the mileage being from 64 to 72 miles, and the average time for the run between the ice house and the plant is 20 minutes,

as against the hour and a half for the team with a load and an hour and a quarter light. With horses the two-horse teams made two trips with three-ton loads. Figuring capacity loads the truck is equal to two four-horse teams and two drivers, or four two-horse teams, to say nothing of the reserve capacity in the event of need.

Comparative Results Obtained.

The trucks have been used longer in Pawtucket and the Blackstone Valley than any other section, the first one being placed in service there, and the regular mileage will approximate 40. Previously, horses were used, but the business has so much increased that comparison cannot be made on the basis of work done with them. The truck covering the Bristol route makes 45 miles or more three days in the week, and about 40 miles the other three days on the Pawtuxet Valley route. The two-ton truck will vary considerably in its work, but it is driven an average of 50 miles daily during the busy season. Considering the numerous stops made the machines are driven very consistently and there is little idle time for them.

The loading and unloading of the ice truck is not as rapid as might be possible with other work, for the force of men at the ice house is necessarily limited, and the load is handled with reasonable care. Unloading, the ice is pushed from the truck platform into a chute and is carried by gravity to the basement of the plant for storage. The loading facilities for the trucks and wagons are well arranged. A long platform extends the length of the building and a dozen vehicles can be backed to this, with room for others to pass in front of them.

The ice boxes on the trucks are filled by gravity with crushed ice, that is, carried from a crusher in the basement by buckets to a chute that can be swung over the vehicles, and the salt barrels are also filled by gravity from a large bin on the second floor. The loading platform is level with the truck and wagon floors and but little time is required, for the filled cans and the packed tubs are ready for the crews to handle. A line of vehicles can be placed along the platform and side loaded with but little waiting. The loading as a rule is done in relays in the morning, and after the starting is made in the morning there is no reason for delays.

Stable and Garage.

The stable and the garage are in the rear of the plant, the property extending back to Atwell's avenue, and the garage is in the basement of a large building that has been specially fitted for this purpose. It will store 10 machines and there is abundant room for expansion. Part of this is to be fitted as a repair shop. The garage is in charge of a mechanic whose work is to keep the machines in operation. This may mean day or night labor and he is expected to do whatever is necessary, assistance being given him when occasion demands. The garage has an equipment of hand tools and facilities for doing practically whatever may be needed. Once each year the trucks

are given overhauls and placed in the best of condition and this work is done when the conditions for work will permit. In the event of road trouble the driver notifies the mechanic and the Cadillac is sent out with whatever may be needed to make a temporary or even permanent repair, and usually there is no need for transferring a load.

As a safeguard against accident a spare front and a spare rear wheel for the three-ton machines, and a spare radiator are kept in the garage, and these have been found exceedingly useful, the wheels in the event of tire damage, and the radiator should a leak develop. With these replacement can be made in comparatively short time and the machines started, while without them the service of a truck might be lost for a period that would mean considerable loss.

As to Outside Work.

Manager Hardy says that he has done enough outside work each winter to pay for the repairs of the trucks, this varying from the haulage of several thousand barrels of apples to carting gravel, while one truck makes one or more trips a week from the Builders' Iron Foundry to the United States arsenal at Wattertown, Mass., carrying castings that are used in the construction of government military equipment. The machines have earned from \$1200 to \$1500 each winter, which has been a very convenient fund when maintenance is considered.

The advantage of the machines as compared with animals in the service of the company is that when they are not operated the expense is small and they are not deteriorating in value. Animals cost practically the same whether they are worked or not. If the work is light the operating cost and the maintenance expense is correspondingly small. This is a factor of material importance. The fixed charges go on, but the labor cost ceases.

Mr. Hardy says that the cost of operating the trucks, three-ton size, will closely approximate \$10.50 a day when new, and that as the service is continued this will increase to about \$12 a day. There is but little variance from these figures in normal service, although if the mileage is increased there will be proportionate fuel and tire expense, and this will be reflected in the maintenance cost as well. His experience, however, has shown that the cost stated is very close to what may be expected under similar conditions. While his mileage is probably large, yet his maintenance and overhauling expense are relatively low because the attention is constant instead of casual. He believes that he will be able to realize seven years' life for a truck because of the care given, and that they are driven by careful men. He educates his own drivers and he has found that men who have driven horses are reliable and responsible. Practically every driver in his employ, including those driving horses, have licenses to drive machines, and he does not have occasion to use untried men. This has been found to be a very good safeguard and protects him in the event of sickness or accident. And each horse driver is

anxiously awaiting promotion to driving a truck. This has placed a premium on the truck driving, and each man regularly working a truck is as anxious to keep his employment as the others are for opportunity to do such work.

Manager Hardy says that he would have to use a very much larger number of horses than he now uses were he to operate with the former conditions, he would not be able to do the work as economically and he would not satisfy his customers, this applying, of course, to work outside of the city. Within the city, with the short routes and the numerous stops, he does not believe that he will come to machines for a long time, because of the need of a decidedly cheaper method of haulage than he has realized with the trucks he now has in use. The Cadillac machine is not operated with a view of economy, but for the purpose of conveniencing patrons and serving customers whose business is valuable. In some instances the cost of delivery is much more than the profit, but this work is credited to promotion and the cost is so regarded.

ASSETS EXCEED LIABILITIES.

The assets of the Brown Commercial Car Company, Peru, Ind., which is now in the hands of a receiver, eliminating every item not having a tangible value, such as good will, etc., show a total of approximately \$126,000, while the liabilities, which amount to about \$100,000, are in part secured by notes pledged on unfinished machines, and which must be completed to have a substantial value. Included in the liabilities is a mortgage for \$47,000 on the real estate. The company has never recovered from the effects of the flood in that section of the state last spring, which did a great deal of damage to the factory and materially delayed the production of machines that had been ordered.

LISTENED TO GYROSCOPICS.

"Gyroscopics" was the subject of the meeting of the Metropolitan section of the Society of Automobile Engineers which was held the evening of Jan. 29 at the house of the Automobile Club of America in New York City. A paper was read by E. P. Hopkins that was descriptive of the use of the gyroscope in the operation of the Hopkins monorail railroad system, that was of material interest from an engineering viewpoint, and a discussion was opened by Edward Durant which considered the scientific value of the gyroscope.

A two-story building, covering an area about 200 feet square, of mill construction, is to be built at Winton Place, O., by the Victor Auto Parts Company. The addition will practically double the production of the concern.

TRUCK MAKERS FIX USERS STANDARD.

Specify Body Dimensions and Weights, Load Capacities, Rates of Speed and Charges for Demonstration, with Recommendation of Adoption---Will Improve Sales Methods.

THE manufacturers of motor wagons and trucks have principally directed their endeavors to the production of vehicles that from the viewpoint of the engineer are well designed. The concerns that are well established build machines generally developed from a standard. Scientific methods are employed in manufacturing, and extreme care has been taken to insure the quality of the vehicles produced. Theory has been supplemented by experience, and wherever necessity has justified improvement has been made, although most engineers believe that standards are desirable, both from the standpoint of manufacturing economically and the uncertainty of experimental productions.

The attitude of the manufacturer with reference to distribution and the attitude of the buyer as regards the maker are not antagonistic, but the builder makes machines that are intended to meet certain requirements and the purchaser believes that he can do work often largely in excess of the capacities provided for by the engineers, the result being that, with a guarantee of factory perfection, the owner demands that the vehicles be kept in repair and in condition for service, no matter what the conditions for use.

The manufacturers of service vehicles, in many instances builders, or former builders, of pleasure cars, have assumed that owners of wagons and trucks will use their property with the same care and discretion that would be exercised with any other property. In this they have applied the usual measure of common sense and assumed ordinary prudence, but the owners, often believing that they were getting something for nothing because of overloading or fast driving, have countenanced what is destructive. Were the o-

ners the only ones to suffer the consequences of their negligence or poor judgment one might not reasonably make protest against their acts, but every interest is affected, and to a degree that is serious.

Standardization Policy.

The condition stated is by no means new, but the results have been so pronounced that the industry, as represented by the National Automobile Chamber of Commerce, Inc., has undertaken to define a policy in dealing with buyers of motor vehicles that will be equitable for manufacturer, selling representative and owner, and when uniformly maintained will be materially beneficial. This does not mean that the manufacturers desire to deprive the owners of what any business man would consider himself morally obligated to supply, but it does mean that the industry has realized the necessity of defining to what extent it is responsible to the business men who use machines.

In determining this policy a series of standards was arrived at by the commercial vehicle committee of the chamber, and this has been prepared in form for transmission to each active manufacturer with the suggestion that the standards be approved and incorporated in the records of each sale consummated in future. The committee has authorized the distribution of sets

of seven cards which show the different standards recommended in 1912 by the National Association of Automobile Manufacturers, the cards being eight by 10 inches in size, printed on one side, and centre-scored so that they may be filed flat in a letter file, or folded once and placed in a five by eight-inch card index file. Each card relates to a single subject, so

Warrant No. _____	Vehicle No. _____
<p>This is to Certify that we, the</p> <p>Sample Motor Vehicle Company</p> <p>of Detroit</p>	
<p>WARRANT each new motor vehicle manufactured by us, whether passenger car or commercial vehicle, to be free from defect in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall, within ninety (90) days after delivery of such vehicle to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to us to our satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties, expressed or implied, and of all obligations or liabilities on our part, and we neither assume nor authorize any other person to assume for us any other liability in connection with the sale of our vehicles.</p> <p>This warranty shall not apply to any vehicle which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any commercial vehicle made by us which shall have been operated at a speed exceeding the factory rated speed, or loaded beyond the factory rated load capacity.</p> <p>We make no warranty whatever in respect to tires, rims, ignition apparatus, horns or other signalling devices, starting devices, generators, batteries, speedometers or other trade accessories, inasmuch as they are usually warranted separately by their respective manufacturers.</p> <p>IN WITNESS WHEREOF we have caused this warranty to be signed by our</p> <p>apartely by their respective manufacturers.</p>	
<p>_____ Signature and Title of Officer</p>	<p>_____ Signature and Title of Officer</p>
<p>Date _____, 191</p>	<p>_____ Company Name</p>

Standard Form of Warranty for Commercial and Passenger Vehicles, Approved as to Form Dec. 3, 1913, by the National Automobile Chamber of Commerce.

Resolved, That in the opinion of this meeting it is inadvisable to encourage the belief that a truck is designed to carry any weight in excess of its rated capacity, or to permit a warranty to apply on any truck which is overloaded, and this meeting recommends that a standard plate be prepared for the chassis to indicate the load capacity.

No Overload Allowance Resolutions, Approved by the National Automobile Chamber of Commerce.

that the series can be separated and cards distributed to the different departments of a factory to which they relate.

Subjects Dealt With.

The subjects dealt with by the cards are: Standard warranty, standard speed rating, body weight allowance, standard overload allowance resolution, standard caution plate, standard frame widths and length and standard demonstration charges. The warranty is a new form, adopted Dec. 3, 1913, and supersedes the motor truck warranty by the National Association of Automobile Manufacturers in 1912. It is a combination of this warranty and the standard for passenger cars adopted in 1910, and it applies to both passenger and freight vehicles.

The tables of speeds, body weights, frame dimensions and demonstration charges are accompanied by charts or curves corresponding with the figures. The caution plate against overloading and fast driving and the standard warranty are illustrated by half-tone engravings. Prices for the plates and warranties are stated. These cards have been sent out to each firm of record as a manufacturer of motor wagons or trucks with the suggestion that the prompt and general adoption of these standards will promote the best interests of the industry. At request it will supply cards to any who fail to receive them, or to organizers of companies that are about to begin production.

Considering these recommendations in sequence it may be said that the standard warranty is intended for use in connection with the standard caution plate to be placed on all machines, but for the proper legal protection to the manufacturer, the warranty should be made a part of the contract of sale by printing the form on all order blanks, preferably on the face, and referring to it in the order by some phrase as the following:

"It is understood that no warranty, either express or im-

plied, attaches to this sale other than that expressed in the standard warranty, approved by the National Automobile Chamber of Commerce, Inc., which is printed above (on the back hereof) and that there are no understandings, agreements or representations not specified herein or in the said warranty respecting the subject matter of this sale."

With relation to the standard speed rating, it is recommended that this be adopted

by the manufacturer, together with the standard warranty and standard caution plate; that the machines be designed to be driven at these speeds as maximum and that the warranty be withdrawn in the event of flagrant violation by the user; that the weight of bodies, whether built by the vehicle manufacturer or by a body builder to the order of the purchaser, should be kept within these allowances, and that any excess of weight above the allowance should be deducted from the rated load capacity of the chassis as indicated on the caution plate.

With reference to the resolution relative to no overload allowance it is stated that in passing this resolution, and adopting standard speed ratings, standard body weight allowances, standard warranty, standard caution plate warning against overloading and fast driving, and standard demonstration charges, the manufacturers hoped by concerted action to reduce, if they could not eliminate, the more common abuses from which the motor truck industry has suffered.

The Standard Caution Plate.

The standard caution plate is to be nine inches width and three inches length, etched on 16 B. & S. gauge rolled brass, with letters recessed and filled with red and black enamel. The accompanying example shows how the figures should be filled. Those that are constant for a given number of machines can be

CAUTION OVERLOADING OR OVERSPEEDING WILL VOID YOUR WARRANTY

3	Ton Truck No.	3912	Speed	11	miles per hour
			Standard		Actual
Freight Load Capacity . .		6000	Lbs.	6300	Lbs.
Body Weight Allowance . .		1500	Lbs.	1200	Lbs.
Weight of Chassis . . .		5600	Lbs.	5600	Lbs.
Total Weight (Chassis, body and load) not to exceed .		13100	Lbs.	13100	Lbs.

1C

Standard Caution Plate for Commercial Vehicles, Adopted by the National Automobile Chamber of Commerce.

dered put on by the plate maker, but the variable figures must be stamped in by hand with steel dies. These variants are the truck number, the actual capacity and the actual body weight. The total weights in both columns should be the same. The adoption of the speed rating is urged, but if not adopted the rated maximum can be used. The figures referring to body weight in the standard column should agree with the recommendation, but those in the actual column should give the real weight of the body, and the difference between the two should be added to or deducted from the rated load capacity and the resultant figures stamped in to show the actual load capacity. The catalogue rating of maximum load should appear in pounds in the first column and the figures in the second column should be the sum or difference of this plus or minus the difference between the actual body weight and the standard body weight allowance. No provision is made for overload capacity. The chassis weight is the weight as built by each manufacturer and may vary with wheelbase, frame length, equipment, etc. The total weight is the sum of the three

Load capacity		Body weight allowance
Tons	Pounds	Pounds
$\frac{1}{2}$	1,000	600
$\frac{3}{4}$	1,500	750
1	2,000	900
$1\frac{1}{4}$	2,500	1,000
$1\frac{1}{2}$	3,000	1,050
2	4,000	1,200
$2\frac{1}{2}$	5,000	1,350
3	6,000	1,500
$3\frac{1}{2}$	7,000	1,600
4	8,000	1,700
$4\frac{1}{2}$	9,000	1,750
5	10,000	1,800
6	12,000	1,900
7	14,000	2,000
8	16,000	2,100
9	18,000	2,200
10	20,000	2,300

sets of figures above it and should be the same in both the standard and actual columns. This is intended to inform the representative of the manufacturer or the tire maker at a glance, after driving the loaded machine on a scale, whether or not it is overloaded and the warranty invalidated. The standard frame lengths as adopted are independent of chassis load capacity, and the chart merely shows the relation of the average frame lengths back of the seat to rated capacities as found in prevailing practise. The manufacturers are urged to instruct their sales departments, branches, dealers and agents not to give or offer any free demonstrations.

Matter of Salesmanship.

As understood the action of the National Automobile Chamber of Commerce practically means that the firms included in it will adopt the standards. That other concerns will accept them there is little doubt. While a number may not do so, there is reason to believe that within a comparatively short time the policies as to conditions of sale and guarantee will be practically uniform. This being so, the sales organization will be placed on a more nearly equal basis. And naturally the matter of salesmanship, how the salesman shall represent the manufacturers, his repre-

sentations to the purchaser, and the conditions that he shall meet with are of unusual importance.

How sales propositions shall be made to business men is a subject of vital importance to the motor vehicle industry. That the real problem of the day is not so much manufacturing as it is selling is a statement not too broad. Engineering knowledge and experience have produced substantial and enduring machines, although there are undoubted possibilities for development, and design and construction are largely based on well established fact. But the selling department of each unit of the industry must deal with new propositions successively, never with two alike, and applying the same principles differently, in every instance with the one purpose of economizing.

There are those who will maintain that this is idealism, and that a practical salesman will dispose of machines as any other product is sold, the utility of the vehicles being whatever can be realized by the owners. That is, a man who is experienced will sell motor vehicles upon their face or known value to the public, and the purchasers must develop uses that

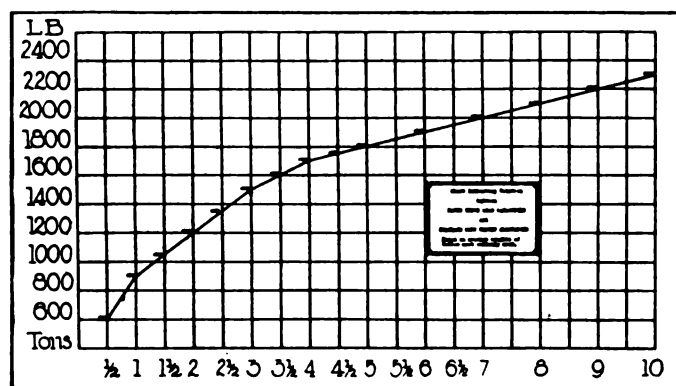


Chart Showing Standard Body Weight Allowances for Commercial Vehicles, Adopted by the National Automobile Chamber of Commerce.

will result in profit. But the purpose of this article is to demonstrate that sales campaigns have had destructive and not constructive results in frequent instances, and that instead of developing business of large volume and substantial character dissatisfaction and distrust followed the enthusiastic but poorly directed endeavors of salesmen.

Early Sales Methods.

The reason for this is not difficult to determine. Considering for a moment the progress of the pleasure car industry one may recall when it was necessary to convince a purchaser that a machine could be operated, that it was practical, that it could be driven a reasonable distance without failure, that it had speed, that it had climbing power, and that it was comfortable for the passengers. One may be inclined to smile at the assumption of mechanical knowledge by the buyers, the estimate of value of differing constructions, the hair-splitting relative to the merit of inconsequential detail of design, and the large claims often made for innovations, but one cannot deny that all of these factors were soberly regarded and assumedly appraised with care by the people who consid-

ered them as real factors when purchasing.

In the first instance the people demanded demonstration of practicality, and followed this by requiring observation and information, usually listening to the arguments of the salesmen and consulting friends with experience before deciding to purchase. With many salesmen the principal object was to create interest by extravagant claims for excellence of design, construction, power, endurance, economy, comfort, and by discounting the quality of every other machine that might be regarded as a close competitor. In brief, they sought to sell by methods that created distrust in every other machine that might be regarded as a possible subject of inquiry by the prospect. As might be assumed, experience with a few salesmen resorting to these methods frequently discouraged those desirous of purchasing, and sales that could have been made were deferred. With pleasure cars, however, amusement and recreation were the principal purposes to be served, expense of operation was secondary, and

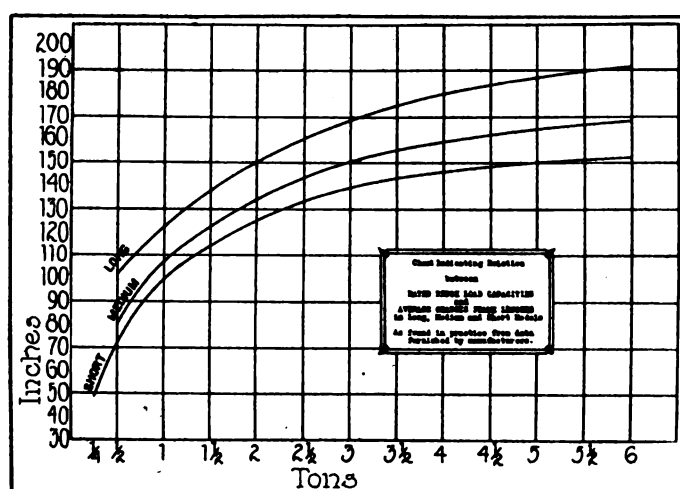


Chart of Standard Frame Widths and Lengths for Commercial Vehicles, Adopted by the National Automobile Chamber of Commerce.

length of service depended upon fancy rather than upon period of utility.

The First Power Wagons.

The first power wagons were pleasure car chassis equipped with service bodies. In some instances trucks were constructed, but these were the exception rather than the rule. They were sold incidental to passenger vehicles and so far as the builders were concerned were not considered after the delivery to the purchasers, who were expected to utilize them as judgment dictated. Later came the specially built wagons and trucks, and the general argument that they could be used in the place of so many horses, wagons or carts and men. Greater speed and larger capacity were claimed to be the qualities in which motor vehicles were superior to horse drawn, and the general application was that in a given time a stated freight could be carried further, or increased tonnage hauled the same distance. But the salesmen soon learned that the expense of operating horses varied materially, and when endeavor was made to ascertain the cost of operation of animals definite data were almost impossible

to obtain, for very few of the many thousands of owners kept accurate record.

In fact, the condition has not materially improved today, even with the careful and consistent endeavor of the most progressive interests of the industry to ascertain precise information, and a very large part of the statements prepared have been based on estimate rather than on actual figures.

Training in Other Lines.

Salesmanship as applied to the motor vehicle industry has been different than that of any other that might be mentioned. The average commercial salesman is first carefully trained with relation to qualities and merits of what he has to sell, perhaps beginning with the purchase of the raw material and continuing through the different processes of production, and the policies of the firm, as well as accurate data as to its relative market value compared with other products. He is expected to have a knowledge of his competitors and their products and methods, and can make accurate estimate of the values of whatever he may be brought into competition with on the basis of the public demand and consumption or use.

Frame width, either 36 or 42 inches, for all sizes of commercial vehicles, measured back of seat.

Frame length, back of seat, to be in full multiples of feet and half feet from 4 to 8 feet, thus:

Feet	(equivalent to)	In.	Feet	(equivalent to)	In.
4	(equivalent to)	48	11½	(equivalent to)	138
5	(equivalent to)	60	12	(equivalent to)	144
6	(equivalent to)	72	12½	(equivalent to)	150
7	(equivalent to)	84	13	(equivalent to)	156
8	(equivalent to)	96	13½	(equivalent to)	162
8½	(equivalent to)	102	14	(equivalent to)	168
9	(equivalent to)	108	15	(equivalent to)	180
9½	(equivalent to)	114	16	(equivalent to)	192
10	(equivalent to)	120	17	(equivalent to)	204
10½	(equivalent to)	126	18	(equivalent to)	216
11	(equivalent to)	132			

No matter what the article, object or service sold, the salesman is expected to be so well informed that he can meet all on equal footing through his ability to convince the buyer of the worth of what he has to sell. In many instances personality or intimate knowledge of the man approached may be material factors in selling, and there is a human element to be considered that it is impossible to estimate. The point made is that the salesman for practically any business of consequence has been educated in what experience has taught is well for him to know, and he is not entrusted with selling until his ability and resourcefulness have been reasonably well established.

Knowledge of Design and Construction.

But the motor vehicle salesman ought to have the same sort of a training as the man who is selling any commercial proposition. He ought to know power wagons and trucks from every angle. He should have a good knowledge of the design and construction of every machine in the market of the type or types he sells. This information will be exceedingly valuable if rightly used, for he can fortify his own selling talk by statements that are well founded. Mechanical principles are clearly established and sound engineering does not require more than the application of them, but to be able to demonstrate the value of a construction

is a decided asset. An engineering education would be extremely useful for every motor vehicle salesman, although not a necessity.

The man who can discuss the machine he is selling with the satisfaction of the man who may have expert mechanical knowledge, or who can correctly inform the man who is not versed in mechanics, may be said to be reasonably well prepared to meet all inquirers between the two extremes, and insight into manufacturing processes, with understanding of the relative values of design with reference to construction, accessibility, convenience of examination or work, and economy of operation, adds to ability to meet situations that may be developed.

Market Is Limited.

Considering the salesman for motor wagons and trucks, he has first of all a limited market. All who are engaged in business, all who maintain delivery equipment, have not the resources to purchase and maintain motor vehicles, even if they have work in which these would serve a useful purpose. Apparently prosperous, a man doing business may be weighted down with indebtedness, and struggling to keep from

Rated load capacity Tons	Pounds	Maximum speed Miles per hour
$\frac{1}{2}$	1,000.....	16
1	2,000.....	15
$1\frac{1}{2}$	3,000.....	14
2	4,000.....	13
$2\frac{1}{2}$	5,000.....	12
3	6,000.....	11
$3\frac{1}{2}$	7,000.....	$10\frac{1}{2}$
4	8,000.....	10
$4\frac{1}{2}$	9,000.....	$9\frac{1}{2}$
5	10,000.....	9
6	12,000.....	8
7	14,000.....	7
8	16,000.....	6
9	18,000.....	$5\frac{1}{2}$
10	20,000.....	5

bankruptcy, while the concern that is seemingly lacking many characteristics attached to prosperity may have business sufficient to justify large investment and ready cash to pay its obligations. The salesman must select those who are the probable prospects if he would concentrate his endeavors. This means he ought to have some knowledge of the different firms, the extent of their patronage, the needs so far as transportation is concerned, and the service that is utilized. This should be acquired preliminary to an approach, for it is evident that if the concern is worthy of attention the salesman ought to be prepared to go to the executive with something more than the proposition that a wagon or truck be bought because the salesman has them to sell and really needs the money he would obtain if the business man would make investment.

The majority of the power wagons and trucks in service today has been sold by men who convinced their customers that theoretically motor vehicles were practical or economical, but the consummation of the sales ended, for the time being, their concern in the machines and their owners. Such salesmen sold as did the pleasure car agents of a few years ago. With them it was a matter of earning a salary or commis-

sion, and so far as they were concerned all interest ceased immediately upon payment of the price.

The Making of Promises.

From the viewpoint of these salesmen the main object was to sell a vehicle, and with the assumption that purchasing was intended and that should the inquirer leave, the opportunity was lost, every legitimate, and sometimes questionable, means was resorted to to conclude a transaction. By this is meant that salesmen, often desperate to make sales, did not hesitate to make promises or assurances, obligating themselves or their employers to whatever they believed was necessary to convince the customers. The sale meant that the salesman had assured himself of the temporary continuance of his salary, or had secured a commission, and the agent had disposed of a vehicle, this justifying the assumption that another order would be placed with the manufacturer.

Motor wagons and trucks could not be sold like pleasure cars. In rare instances a man might be willing to pay a deposit and sign an order without the preliminaries usually regarded as necessary. The

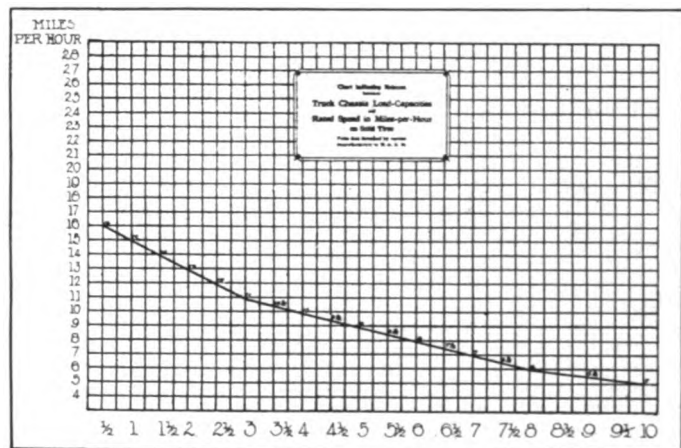


Chart Showing Standard Speed Rating for Commercial Vehicles Adopted by National Automobile Chamber of Commerce.

agent who invested his money in a demonstrating machine usually found that educating people to possibilities of power equipment cost money, and unless vehicles could be sold the outlook was not encouraging. There is no doubt that sales came much too slow for the general satisfaction of those engaged in selling, and without doubt business desperation forced many into making concessions and obligating themselves beyond what had been anticipated or expected by the manufacturers.

So far as the salesmen were concerned, promises might be made from the belief that the agents would not be required to fulfill them, and often when demands were made by the owner the agent made such adjustment as he could and in turn looked to the manufacturer for compensation under a guarantee. Sometimes the assurances were given without the knowledge or even against the orders of the salesmen's employers. The wrath of a disgruntled customer was even more feared than now, and adjustment of the difference could only be reached by compromise. The writer has known of instances where a man holding an

agency has offered a demonstrating truck at a substantial reduction in price with the purpose of selling and discontinuing the business, although he was aware that his offers would probably materially affect the business of the man who might succeed him.

Logically, at least, the acts of the salesmen are reflected upon the employer and eventually upon the manufacturer, and without doubt many a machine has been condemned simply because the owner believed that he was entitled to receive practically free maintenance.

Knowledge of Highway Transportation.

The motor truck salesman should have as comprehensive knowledge as he can acquire with reference to highway transportation, for this will qualify him to deal with the primary conditions that must be considered when a proposal is to be submitted. The man who bought a machine because it would in theory do more haulage in a given time than horse equipment might have found from experience that it would be equal to expectations if it could be worked to capacity, but the one essential was the necessary work. That

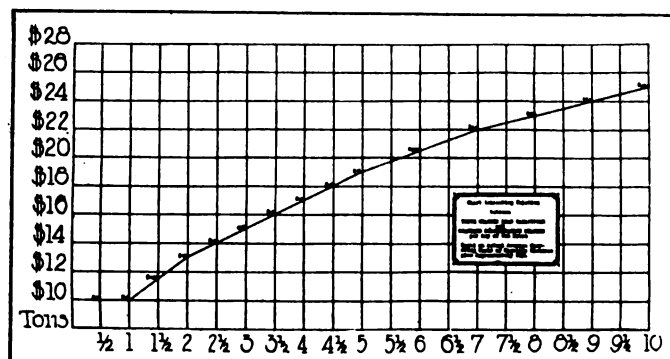


Chart of Standard Demonstration Charges for Commercial Vehicles, Adopted by the National Automobile Chamber of Commerce.

is, salesmen have sold and business men have bought wagons and trucks without accurate knowledge of what capacity was required.

The salesman was willing to sell whatever was wanted and left this to the judgment of the purchaser. The larger the price the more his credit for the sale. The buyer, however, found that he had a vehicle so inadequate that it was constantly overloaded and abused, or so large that his cost of haulage was increased beyond what he had reason to expect. The question might be asked: Why should a business man be so misled? And reply can be made that it was entirely reasonable for him to assume that the salesman had the same knowledge of the subject of transportation that any other man might have of a business he represented as a selling agent.

Following this line of reasoning one might maintain that a business man ought to be equally well informed of every detail of his business, but when one understands that the acceptance of a condition largely from custom was not real indifference, but an assumption that further economy was not practicable, this condition is not strange.

The representative of a manufacturer of a machine

that will cost from \$1000 to \$5000 cannot be compared to the salesman who is selling trucks. The former is well trained and he visits men who at least might use what he is selling. He interests the principals whom he meets because he is dealing with what can be profitably utilized. His market may not be large, but it can be developed. The competition is not general. He may have to do missionary work, but there is the prospect of material benefit later on. The latter, however, must necessarily educate his prospective customers to the necessity of economy. Generally they have capital invested in equipment and facilities, and in many instances they believe that they must sacrifice this if they are disposed to make a change.

There are those who have large haulage requirements who believe that the only practical determination is to work animal and motor vehicles in the same service for a considerable period of time. Some of the largest users of machines are men who worked those first purchased from three to eight years before they were fully convinced that the change would be economical. The salesmen who sold the initial motor ve-

Load capacity		Demonstration charges per day of 10 hours
Tons	Pounds	
1/2	1,000	\$10.00
1	2,000	10.00
1 1/2	3,000	11.50
2	4,000	13.00
2 1/2	5,000	14.00
3	6,000	15.00
3 1/2	7,000	16.00
4	8,000	17.00
4 1/2	9,000	18.00
5	10,000	19.00
6	12,000	20.50
7	14,000	22.00
8	16,000	23.00
9	18,000	24.00
10	20,000	25.00

hicles were delighted to even secure an order, but those who took the later orders had a comparatively easy task and with relatively brief intervals between sales.

Need of Efficiency Experts.

But the industry is facing a problem that has been developed by the education of salesmen, and that is the necessity of securing the services of those who are sufficiently well informed to analyze a transportation service and determine what types of vehicles, what number and what capacities are necessary to do its work; what facilities are necessary or desirable, the arrangement of these, and to organize the workers and create a system by which the department shall be administered. The suggestion has been made that some companies can profitably enlist such men and have them plan and create on what has been developed by the selling force. These men might be rated as transportation efficiency experts and as such they would command adequate salaries, but such services could not be expected from men who do the preliminary work.

By this is meant that there is a vast difference between the salesman and the man who develops efficiency and economy. The salesman, however, must

ecessarily be the man who has the qualifications to get men of affairs, who has the knowledge that will make possible the presentation of practical uses of motor equipment, and who can stimulate interest. There are those who have realized the value of expert transportation men and are willing to pay well for the oversight of departments.

But where there is one comparatively large installation there are hundreds where one or several vehicles would meet all requirements, and these are the prospects that must be dealt with by the salesman. Naturally this means that they must have ability to judge conditions of use, suggest methods of operating, and if desired exercise supervision to whatever degree will satisfy. The motor truck salesman who in seeking business intimates that the owner does not economically direct his own business may learn to his sorrow that the intimation has provoked resentment, and yet to prove his own case he must establish that economy is not only possible but practical.

The motor truck salesman must be able to establish confidence in what he is selling, and he is often confided business methods and facts that cannot be used by him indiscriminately. Frequently men will say that any publicity relative to their haulage services will be used advantageously by competitors, and they will not consent to its free distribution. Nor is it probable they will give to those engaged in similar businesses facts that they believe will be profitably used by their business rivals. For these reasons the salesman is often compelled to observe confidences that preclude the utilization of information that would be extremely valuable.

Operating records of concerns undoubtedly convey to those who might desire to know very accurate knowledge, and while in some instances these cover periods of several years, as a rule the facts obtainable are for such brief intervals that these may not be convincing to those who may depend upon them to justify investment of considerable sums of money.

The problem of the salesman, who must create business, is vital to the industry, and to meet with a reasonable measure of success these agents must have special training and capacity. The more knowledge they possess of a large number of businesses the better they are fitted for the work. The salesman meets with new conditions with each prospect, and he must be capable of convincing those whom he approaches that his propositions are practical. He must be able to satisfy his customers and continue his relations with them, and this means that he must have the support of his firm. The motor truck must be sold as an object of standard value and utility, with such guarantee as the maker shall give, and beyond that, so far as its operation is concerned, it must be maintained at the expense of the owner. In all phases of utilization, to secure economy and efficiency, the salesman can be a potent factor, and he can exercise an oversight for his customers that will be of substantial advantage to his firm and to the owner of the machines.

MARSHALL EXECUTIVE SECRETARY

New Official Named by Electric Vehicle Association Assumes His Duties.

The promotive work of the Electric Vehicle Association of America has become so diversified and of such volume that the officials have created the office of executive secretary and named A. Jackson Marshall to direct the normal activities of the organization. Since the formation of the association the work has been conducted by the officers, who have accomplished much considering the limited time they could devote to the work, but the demands became such that they could no longer continue this policy save at sacrifice of their own business interests.

The creation of a permanent secretary was recommended at the Boston convention in 1912, but in the interests of economy the officers deferred action until the time came they could no longer continue. With the appointment of Mr. Marshall a system has been devised that will insure the concentration and expedition of the work. Mr. Marshall was until recently identified with lighting companies and has a broad and comprehensive knowledge of central stations. For several months previous to his appointment he had been associated with the General Motors Truck Company, being in charge of the business interests of this company in northern New Jersey, with offices with the Electric Garage Company at 123 Washington street, Newark, N. J. The headquarters of the Electric Vehicle Association have been established in the United Engineering Societies' building, 29 West 39th street, New York City, and Mr. Marshall is in charge.

It is the purpose of the officers to undertake plans that had previously been impossible because of the limited time that could be given them, but now Mr. Marshall will devote his energies to these and to the demands that have multiplied with the increase in membership and scope of the organization.

BUYS 24 PACKARD TRUCKS.

The Loose-Wiles Biscuit Company, a concern operating bakeries in a number of cities, has bought 24 Packard machines, 13 of the three-ton type and 11 two-ton, which will be utilized in connection with the mammoth new plant the company is constructing in Brooklyn, N. Y., and which will probably be ready for operation about June 1. The company is using Packard machines in Boston, Chicago and Kansas City.

With a force of about 125 men the factory of the Milwaukee, Wis., Motor Company, now the property of Harris Bros., of Chicago, is now in operation, after cessation of production last June because of bankruptcy. The intention of the new owner is to make the property profitable and dispose of it.

FEDERAL SALES CONVENTION.

Distributing Force Forms Organization to Promote Selling and Service.

A convention of the sales organization of the Federal Motor Truck Company, Detroit, Mich., was held at the factory in that city, Jan. 19-21, and aside from the systematization and harmonizing of methods and policies with a view to better directing the endeavors of the agents and representatives, a result was the formation of an association of distributors that is expected to be productive of decidedly practical and beneficial results.

The convention was attended by upwards of 50 dealers, who came from all sections of the country, from the Atlantic to the Pacific Coasts, and it afforded opportunity to make analysis of the conditions for business as reflected by those in position to make accurate estimate. The prevailing opinion was that the coming year ought to be the best the company has yet experienced, and that with the selling force better organized and with more intimate knowledge of the market and the requirements of the people the sales should be materially increased.

The evening of the concluding day a banquet was given by the company at the Hotel Cadillac, which was an occasion of much pleasure. The menu was stated in representations of engineers' blue prints, bearing the Federal seal in gold, and on the title page was the inscription "Bill of Material and Specifications of 1914 Model Federal Ginger Dinner, All Material to Be f. o. b., Hotel Cadillac. Deliveries: 7:30, 1-21-14." With this was printed parodies of well known popular music, all of which were adaptations to extol the qualities of the Federal machines.

In connection with the dinner was an entertainment, a feature of which was a one-act play written by Kirk B. Alexander, entitled "Pass It Along", which was stated to be "A Realistic Melodrama of the Motor

Truck Business in One Frightfully Frank Act." The skit was a burlesque of the relations of factory officials and dealers, and the men who held the jobs assumed the characters. Following the pleasures of the evening the National Federal Dealers' Association was organized with Allan Baker, St. Louis, Mo., president; William L. Hughson, San Francisco, vice president; C. T. Chenevert, assistant sales manager with headquarters at New York City, secretary, and H. S. Dunlavey, Chicago, treasurer. The specific purpose of the association is to foster the spirit of co-operation of the selling force, and to promote the service given to owners of Federal machines.

LOCATED IN NEW FACTORY.

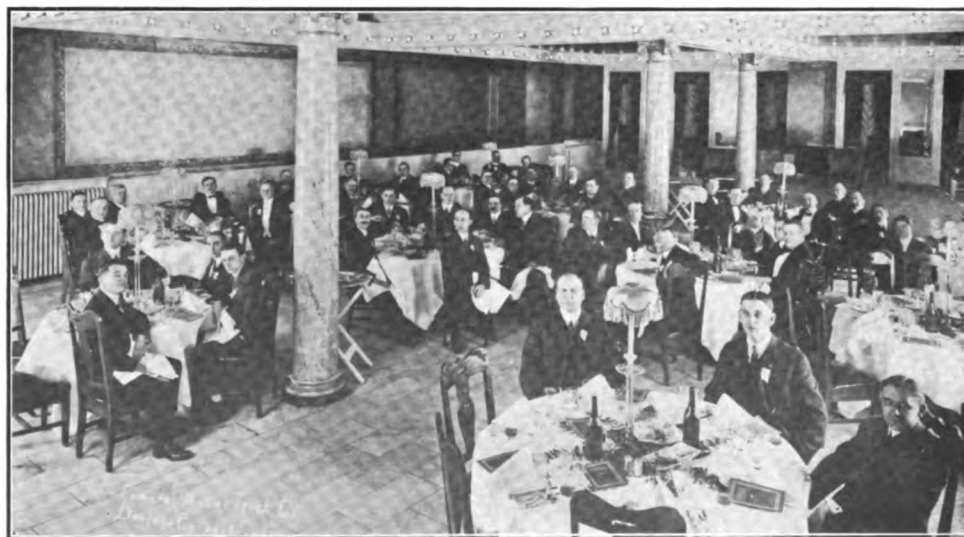
The Morton Truck and Tractor Company, Harrisburg, Penn., has purchased the plant once operated by the Model Typewriter Company in 19th street, that city, a three-story structure, and will shortly begin the manufacture there of the Morton trucks and tractors. The company has increased its capital from \$250,000 to \$300,000.

WILL BUILD FIRE APPARATUS.

The Haney Rescue Apparatus Company has been incorporated at Tampa, Fla., with authorized capital of \$2,000,000. The purpose is to acquire the interests of the Haney Fire Apparatus Company, Stockton, Cal., and build and equip a factory at Tampa at a cost of \$150,000 to \$200,000, to manufacture automobiles, motor trucks, pumps and fire elevators.

ANOTHER GARFORD STATION.

The R. & L. Company, eastern distributor of Garford trucks and Willys Utility wagons, which now has two service stations in New York City, has planned a third which will be erected at Atlantic and New York avenues, Brooklyn, close to the Brooklyn branch. The building will be 100 by 60 feet, of fire-proof construction, without posts, and designed purposely for the service. It will be open constantly to afford service to Brooklyn and Long Island residents, will be stocked with parts for all trucks and pleasure cars, and mechanics will be on duty at all times. Besides the two stations at 64th street and West End avenue in Manhattan and at 150th street and Gerard avenue in the Bronx, the company has a station at Newark, N. J., the latter for the convenience of the New Jersey people.



The "Ginger" Dinner of the Salesmen and Officials of the Federal Motor Truck Company, Held at the Hotel Cadillac, Detroit, Mich.

THE INITIAL CHARACTERISTICS OF THE PHILADELPHIA THIN PLATE BATTERY.

By James M. Skinner, Engineer of the Philadelphia Storage Battery Company.

UNTIL recent times most batteries have been sold as a finished product, assembled, developed and ready for use. Of late the tendency has been in another direction, and today many large battery users are buying from the battery companies merely the knocked down parts—plates or groups, separators, etc., and are doing their own assembling and developing.

Although the ordinary battery instruction book published by the Philadelphia Storage Battery Company gives full directions as to the proper developing procedure, it does not go far into the whys and wherefores, nor does it give any explanation of the initial capacity characteristics which are sometimes very puzzling to the user. It is the purpose of this article to dwell particularly on these omitted points. The article is centred upon the Philadelphia thin plate for two reasons, first because the Philadelphia thin plate is the standard of all the batteries which can be assembled by the user, and second, because the tests, upon which the statements given are based, were made upon Philadelphia thin plates.

Initial Charge.

As a general proposition the more plates which are put into a given size jar, the longer it will be necessary to continue the initial charge. At first glance this appears to conflict with the well known fact that thin plate batteries have a higher efficiency than thicker types. But it must be remembered that at the beginning of initial charge the plates are in a very different condition than at the beginning of an ordinary service charge. At the beginning of initial charge the positives are fairly free of sulphate, while the negatives are very heavily sulphated, particularly on the surface, having been purposely put into this condition to avoid heating and so that they may better withstand the knocks and bumps of shipping. The depth of the hard surface sulphate is about the same regardless of the thickness of the plates. Furthermore, the wood separators are not yet thoroughly opened up. The purpose of the initial charge is to complete the charge on the positives, to soften up the hard negative surfaces, to bring the wood separators into porous normal working condition and to balance things up generally. Now the more plates in a given size jar the more hard negative surfaces there are to soften and the more sep-

arators to open up. Therefore the more plates in a given jar the longer the initial charge required.

A high current rate cannot be used on initial charge for several reasons. First, the positives are nearly charged to begin with and a high current rate would cause them to gas excessively, and would tend toward heating. Second, the wood separators are of high resistance and forcing heavy current through them would surely cause heating. The proper rate to use averages 30 per cent. of the normal catalogue discharge rate. This figure is selected because a battery will usually take it for the entire initial charge without heating. If the temperature rises above 100 degrees, however, the rate must be lowered.

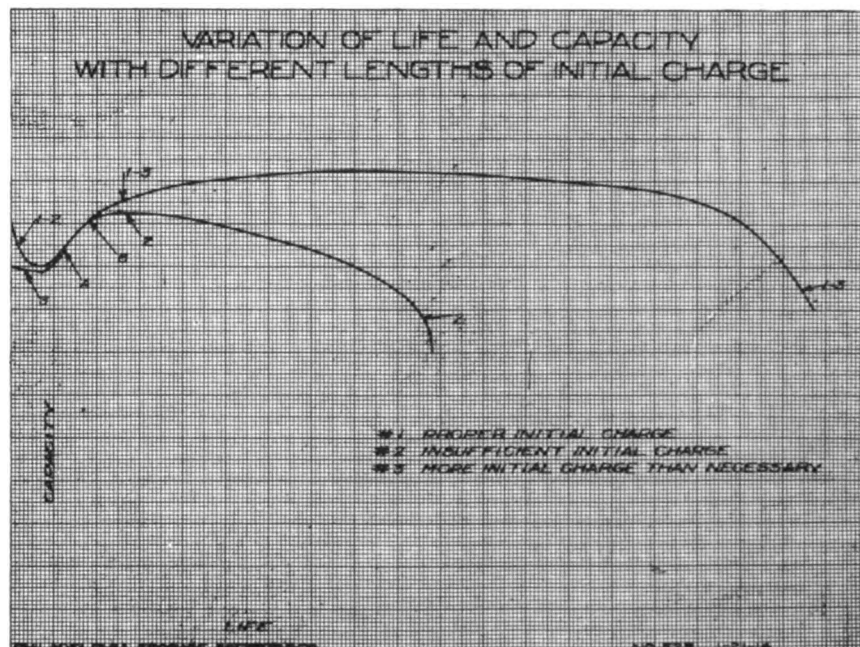


Fig. 1.

Although it is desirable to keep gassing down to a minimum on initial charge, just as on any other charge, it cannot be so entirely eliminated on initial charge as on ordinary service charges, because as mentioned above the positives are fairly free of sulphate to begin with and will therefore start to gas long before the heavily sulphated negatives are reduced. This unbalanced initial condition of the plates is unavoidable, but its effect can be nullified by keeping the rate low enough to avoid overly hard gassing of the positives.

The time required for initial charge with Philadelphia thin plates is about six to seven days at 30 per cent. of the normal discharge rate, or in ampere-hour input about seven to eight times the rated ampere-hour capacity. If the current rate is lowered the

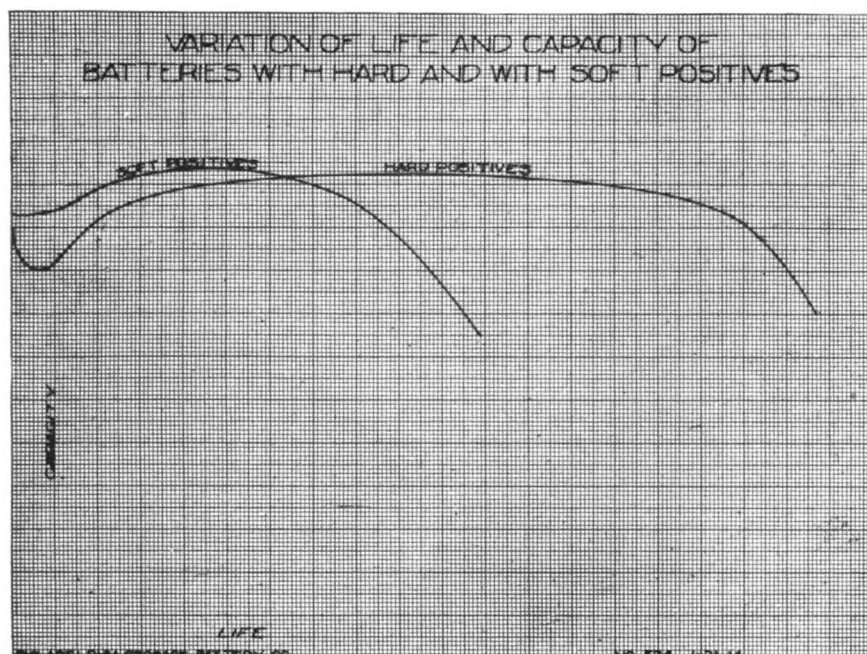


Fig. 2.

duration must be proportionately increased. In the great majority of cases an initial charge continued until the ampere-hour input is from seven to eight times the rated ampere-hour capacity will be entirely sufficient, but as additional checks the following points may be noted:

1. The initial charge is never complete as long as the specific gravity of the acid is rising, and may not be quite complete when it does stop rising, because the increase due to the acid coming out of the plates may be balanced by the amount being carried off by the gas.

2. The initial charge is not usually complete until the voltage of each individual cell is 2.60 or above at a current rate 30 per cent. of the normal discharge rate.

3. The initial charge is not usually complete until the positive cadmium reading is 2.39 or above at a current rate 30 per cent. of the normal discharge rate.

4. The initial charge is not usually complete as long as the separators are giving off foam. The foam is the result of an action between the wood, lead peroxide and sulphuric acid and is carried up to the top of the cell by the gas generated in the plates. As long as it continues it indicates that the separators are not yet opened up to the proper extent.

If the initial charge is continued longer than necessary it is possible that a slightly lower capacity will be obtained on the first discharge; but this effect is only temporary and is attended with no danger to the life of the plates. It is due to the fact that the thin surface film of peroxide on the positives has been washed off to a greater extent by the longer continued gassing. On the other hand, if the initial charge is unduly shortened, there is danger that the negatives, not having been given the proper start, may cause trouble later on in the life of the battery, even though, due to their normal excess initial capacity over the positives,

they may not cause any decrease in the initial capacity of the battery. The theory here is as follows:

When negatives are not fully charged on the initial charge there remains in them some unreduced lead sulphate. This sulphate is rather dense and large particled to begin with, and being in contact with sulphuric acid tends to constantly dissolve and redeposit, and thus to become even harder and of still larger particles. The presence of this sulphate in the plate tends to clog the pores and to prevent normal acid diffusion. In addition, each large particle seems to act as a magnet, attracting to it on each discharge a small quantity of the normal sulphate then produced and adding it to itself, thus further tending to block up the pores. It is easy to see that the consequence will be a steady decrease

in negative capacity, with a possibility of the sulphate becoming so hard that even long continued overcharging cannot put it into good condition. Happily the only precaution necessary to entirely eliminate any chance of such negative trouble is a thorough first charge, which will entirely rid the negatives of their initial sulphate.

Fig. 1 shows three life curves. No. 1 is a battery with the correct initial charge. No. 2 has been given too little charge, No. 3 has been given more than necessary. It will be noted that 1 and 2 start together. The negatives in 2, although undercharged, have still enough capacity to give as much as the positives and nothing is noticed on the first few discharges. No. 3 starts off somewhat lower than either of the others. The negatives are in perfectly good shape, but their excess capacity does not have a chance to show because the positives come down first. Thus the positives are limiting the capacity in all three cases and the capacity is lower in 3 simply because the charge has been continued for say 10 days instead of seven, and the soft surface film of peroxide has been washed off to a greater extent. But notice at A that all three are giving the same capacity, and that 1 and 2 are below their initial capacity. The surface films of peroxide on 1 and 2 have been softened and washed off by the working of the battery, and all the positive plates are now in identical condition. Between A and B the surfaces of the positives are gradually softening, due to the charging and discharging, and the capacity is increasing, all three to the same extent. But at B, 2 starts to fall back. Why? Because the negatives are showing the effect of the initial undercharge, are losing capacity, and are now going down before the positives and limiting the capacity of the cell. The rest of the figure is self-explanatory. To sum up, any low capacity from too much first charge is temporary and has no appreciable effect on life, but too little first

arge may materially shorten the life by causing an
mate shortage in negative capacity. Therefore, in
e of doubt, play it safe.

Hard and Soft Positives.

Fig. 1 dealt principally with negatives. Fig. 2 con-
sists itself with two widely different kinds of positive
es, those with soft paste and those with hard paste.
t positives at the start look fine. They give high
ial capacity and quickly rise even higher, and after
r or five months of service look better than ever.
about that time, depending on just how soft the
te was, they begin to show signs of going back
then quickly go down. Hard positives on the other
d are sometimes very difficult to get along with
ally. The capacity is good on the first discharge,
then starts to fall off and may decrease a little for
next two to five cycles. It may then hold steady
a few cycles and give no indication of ever increas-

But after a maximum of about a dozen cycles it
ts to climb and goes steadily upward until, just
at the time that the soft plate capacity begins to
down the capacity of the hard plates is beginning
ach its maximum. The essential difference is this,
soft plates work throughout their entire depth,
the whole mass of material grows soft and mushy
ice, falling quickly to the bottom as sediment; the
plates work principally on a softened surface
which, as it sloughs off, is constantly reformed
the hard material underneath. The capacity on
first few discharges is likely to decrease because
nitial film is washing off and the hard underneath
erial is not softening quite as fast. However, the
nd film will surely form if charging and discharg-
be persisted in, and once it properly starts the ca-
y will increase in many cases to 20 per cent. above
l capacity.

ow, all this is in one sense very unfortunate. Most
ries are given their service test after one or two
loping discharges, and if they con-
hard positive plates their capacity
e time of test is at the lowest figure
it ever reaches, and perhaps consid-
y below rating. Naturally the sus-
ns of the purchaser are aroused at
—his first thought is that he has
old of a very poor or very much
ated battery, he promptly registers
nphatic kick with the battery com-
, and in the meantime takes the
ry out of service. Now what the
ry needs is work, and the harder
work the better. Charging alone
never raise the capacity, because
as keeps washing off the surface
as fast as it is formed. Discharg-
needed in addition. The sulphate
ed during the discharge, especially
e a long discharge, spreads the ma-
apart and paves the way for
pores when it is removed on

the next charge, thus rendering easier the formation
of a deeper surface film. To raise the capacity, the
longer the discharge the better, providing that it is
compensated for by sufficient charge to remove all the
sulphate formed. There is one precaution necessary
however—do not at any time allow any cells to re-
verse.

Method of Procedure with Hard Paste Plates.

To incorporate the above in the form of definite
directions: If it is possible to get along with low ca-
pacity for a short time, put the battery into service,
work it hard, charge it well, and the capacity in two
or three weeks will have risen to rating or above. If
on the other hand it is necessary to have full rated ca-
pacity before putting the battery into service the fol-
lowing procedure will hasten matters a great deal:
Take an ordinary discharge and when most of the
cells have come down to 1.70 volts, cut the current
rate in two and continue the discharge until about
half the cells have reached zero or thereabouts. If a
few cells reach zero long before the others, prevent
them from reversing by connecting a wire across their
straps. Following this "run-down" give the battery
a full charge and discharge again. The capacity will
usually be greater than before. If it is still low an-
other "run-down" may be taken and the capacity on
subsequent discharges is almost sure to be above rat-
ing. The above procedure, providing that no cells are
reversed, will have no appreciable effect on the life
of the battery unless repeated too often. Three times
is a safe maximum.

A more thorough investigation of the effects of
this "draining" or "run-down" procedure may be in
order here. The net result of a run-down is to deepen
the surface film. If a run-down is taken following the
first discharge the capacity on the second discharge,
assuming of course a full charge between, will always
be higher than the capacity without a run-down hav-

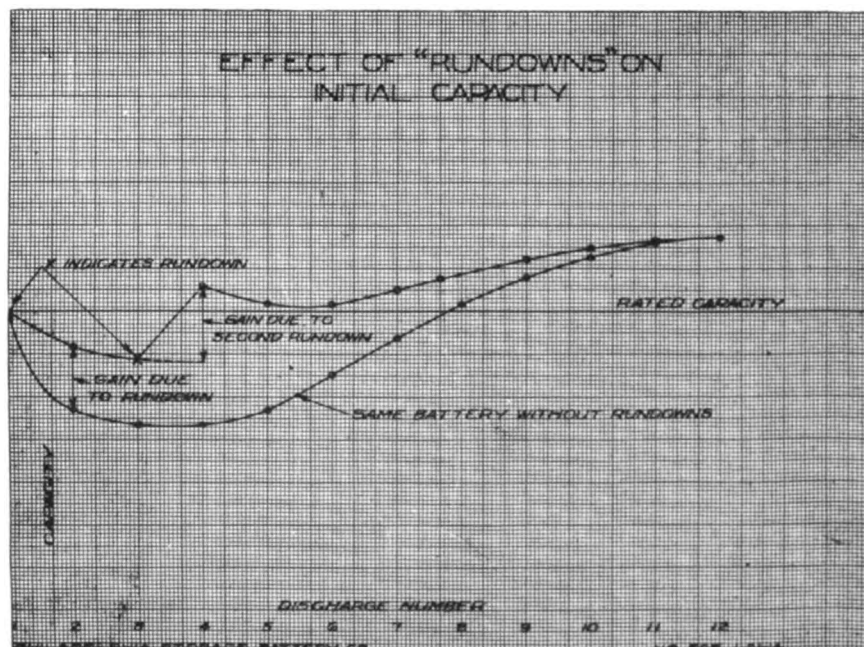


Fig. 3.

ing been taken, but it may still be below the initial capacity. Whether it is above or below depends merely upon whether the film has been deepened to a greater extent than it has been washed off by the working of the battery. On this basis it is easy to see that hard gassing on the second charge might wash off so much of the film that there would be almost no gain in capacity due to the run-down. When the run-down process has been employed and the battery thereby worked up to a little above rating, the capacity will usually fall off a little on the next few discharges and then start to climb. It will not, however, fall as low as it would have without the run-downs and it will start to rise more quickly.

Fig. 3 shows the effect of two run-downs on the capacity of the early discharges. Notice that while the capacity on the second discharge is less than that on the first, there is quite a substantial gain over the capacity obtained without the run-down. On the third discharge the capacity drops below the second, but would never go as low as the lower curve. Where possible it would be well to stop here and to allow the capacity to work up normally in service. Note the effect of the second run-down in raising the capacity above rating, but notice that there is still a slight drop on the discharges following the run-down, indicating that the run-down film has washed off slightly faster than it has been reformed. Finally notice that after about a dozen discharges both batteries are giving the same capacity. In other words, the two run-downs, while effective in increasing the initial capacity, have no effect on the ultimate capacity. From this it may be seen that there is no use in spending the time and current to run a battery down even once, if it can be put into service and made to perform useful work while the capacity is increasing. It is only in cases when high initial capacity is absolutely required that run-downs are economical. The capacity will always come up without them if the battery is put to work.

"Run-Downs" Not a Universal Cure-All.

It must not be assumed that run-downs are a universal cure-all. They are applicable only to new hard plate batteries which are showing low capacity even after full charges and they must be carried out with common sense and careful attention and not repeated more than twice. They should not be used unless the capacity is considerably below rating and it is better where possible to let the capacity work up more naturally under ordinary service discharges and full charges.

It is hoped that the foregoing may be helpful toward a better understanding of the initial characteristics of the thin plate and particularly of the hard positive thin plate. The gist of the matter is this—what hard, low capacity plates need is work, and if it is given them, either in service or by run-downs on the bench, the capacity will surely rise above rating and often far above, and that, furthermore, any low initial capacity obtained will always be compensated for many times over by the longer life obtained.

TO LOCATE AT MOUNT VERNON.

Ward Motor Vehicle Company Will Remove Plant from New York.

The Ward Motor Vehicle Company, now located in a factory at Concord avenue and 144th street, Bronx, New York City, has purchased a site in South Fulton avenue in Mount Vernon, N. Y., on which the company purposes to build a manufacturing plant, probably in the spring. The Ward Motor Vehicle Company is one of the old concerns of the electric motor vehicle industry. It was organized primarily to construct electric wagons for the Ward-Corby Company, a baking company that has bread bakeries in a considerable number of cities, and for a number of years its business was practically confined to the production of a comparatively light type of wagon that could be used for the delivery of bread from the bakeries to customers.

The electric vehicle was favored because of the absence of odor of any kind and the necessity of utilizing machines that would not in any way cause deterioration of the bread. A standard type was adopted as suited to the particular work and until about two years ago the company produced these, a comparatively small number being built to order. The company's officers then decided to construct vehicles commercially, and a standard design was adopted and this chassis was built, and is now produced, in 2000, 4000, 6000 and 8000-pound capacities. In practise these machines were efficient and economical and afforded excellent results.

The Ward-Corby Company has in Brooklyn, where its New York factory is located, one of the largest installations of electric vehicles in the world, there being about 160 of them in daily operation. Because of the number of Ward machines in service its maintenance department is of considerable size.

The intention of the company is stated to be the erection of a factory that will have ample machine and hand tool equipment and facilities for producing several hundred vehicles a year. The plant will have a spur track from the Westchester branch of the New Haven railroad and a dock on East Chester creek, where small cargoes of fuel and material can be received or finished machines shipped. Work on the buildings will be begun in the spring and hurried to completion. The company will employ several hundred hands when working to capacity. While no announcement has been made it is believed that considerable attention will be devoted to the production of pleasure cars.

With capital of \$100,000 the Electromobile Company has been organized at St. Louis, Mo., under the law of Missouri, by Sanford J. Bernheimer and others, to build industrial trucks for internal freight work.

S. A. E. SUMMER MEETING.

The committee in charge of the arrangements for the summer meeting of the Society of Automobile Engineers, which will take place at Cape May, N. J., June 27, has made material progress, and the purpose is to make the occasion one of unusual interest to the members and their families. The committee has engaged the entire hotel, which has 350 rooms, for the period the meeting will be held, and all of the means of amusement, the privileges of the bathing beach, golf links, tennis courts and the like will be reserved exclusively for the benefit of the members of the society and their families.

The professional sessions of the society will be of decided interest, for special papers will be read and discussion will take place, but in addition there will be entertainment in the open air each afternoon and at the hotel in the evening. Among the features will be a moving picture lecture on the parts of Europe that will be visited by the society during the projected tour abroad next autumn. Special trains will be run from Philadelphia to Cape May for the transportation of the members, and special rates have been obtained for the accommodation of the visitors. The mid-summer banquet will be an occasion of unusual importance.

PALMER-MOORE OFFICERS.

The stockholders of the Palmer-Moore Company, New York, N. Y., at the annual meeting of that concern, elected these directors for the ensuing year: T. G. Meacham, T. W. Meacham, J. F. S. Meacham, C. L. Palmer, A. N. Palmer, Edward Moore and R. R. Scott. The directors organized as follows: President, T. G. Meacham; vice president, T. W. Meacham; secretary-treasurer, C. L. Palmer. The reports of the company showed that the concern was in a very satisfactory condition.

Clifford B. Myers, who was general manager for the Swinehart Tire & Rubber Company, Akron, O., resigned that position and after a rest will probably associate himself with a concern engaged in a similar line of production. Mr. Myers was for a considerable period associated with the Diamond Rubber Company.

The laboratory and testing department of the American Bronze Company, Berwyn, Penn., is now in charge of Leighton Dunning, who was a member of the engineering department of the General Electric Company, Schenectady, N. Y.

The appointment of H. H. Edge, superintendent, to the position of factory manager, is announced by the Automobile Company of America, Bridgeport, Conn. E. F. Russell, resigned.

DRY GOODS DELIVERY SERVICE.**National Association Creates Department to Promote Transportation Efficiency.**

A substantial evidence of the keen interest of business men in transportation efficiency is the fact that the National Dry Goods Association, which has membership composed of firms in all sections of the United States, has organized a department devoted to the promotion of the haulage services of the members. The association has for years carried on work that has been of large practical benefit to the members, and as this has been developed departments have been created and placed in charge of men of experience and recognized capacity, the services of the divisions being at the command of those who sought advice that they might improve conditions so far as their businesses were concerned.

The association has headquarters in New York City, and there the organization is centred, the different departments maintaining activities that may be required to meet the demands of the members. A considerable proportion of the firms having membership have delivery services, and these are proportionate to the needs. Some have motor equipped departments, developed by years of experience, but many are beginning to consider changes from animal vehicles and seek to obtain through the association the information that they might obtain by audits of books or by the maintenance of systems of records.

But the majority of requests are for facts that are required immediately, and delay would be a matter of material consequence. While it may not be practical to ask local competitors for this detail the association can from records supply much information that will be of decided benefit, and any member is justified in asking for whatever will serve his purpose. The frequency of these requests and the widespread interest of the members prompted the directors to create the department, and all having membership have been asked to contribute facts for the records. With the accumulation of these data the association placed at the head of the bureau J. M. VanHarlingen, who has been known as a transportation engineer, having had considerable experience with a large manufacturer of trucks, and he is now at work systematizing the records with a view of affording the members a standard character of information that may be available at any time. The policy of the association is to broaden the scope of the department and strengthen its efficiency wherever this may be done.

The Perfection Spring Company, Cleveland, O., has established a service station at Euclid avenue and 63rd street in that city, and will, it is stated, extend this department by the establishment of similar stations in New York City and Chicago.

STANDARD CHARGING PLUG.

Two Sizes, Outside Contact Positive, Approved by Electric Vehicle Association.

For the benefit of all who may be in any way interested the Electric Vehicle Association of America is distributing a specification sheet showing a detail sketch of the standards for charging plugs recently approved by the organization. Those familiar with electric vehicles understand the value of this information, but for the benefit of those who may not be informed the explanation is made that the charging plug is the terminal of the cable lead from the line carrying the current, and is a permanent fixture. All vehicles are fitted with a receptacle, so-called, which is connected with the wiring of the battery and the operation of charging is practically automatic when the charging plug is fitted into the receptacle.

But efficient transmission of energy is only practical where the contacts are good and the charging plug fits the receptacle. Until the present time charging plugs and receptacles have not been uniform. A charging cable and plug is not generally carried, and when in the event of emergency a supplementary charge is necessary if the plugs of the cables will not fit, or fit imperfectly, the receptacles of the vehicle, a situation results that is exasperating, if not serious, and when applied to a service machine may be discouraging.

A standardization committee of the association carefully considered the problem, and in communicating with manufacturers of vehicles found that out of 20 replies 13 were using a concentric type plug. Of this 13 nine made the centre terminal negative, and five manufacturers made the centre terminal positive. In view of the facts ascertained the committee recommended that the association approve a plug with the outside terminal positive and the inside negative.

The specification sheet shows that the committee recommends two standard sizes, the smaller of 50 amperes capacity for pleasure cars, and the larger of 150 amperes capacity for trucks, either to have a 50 per

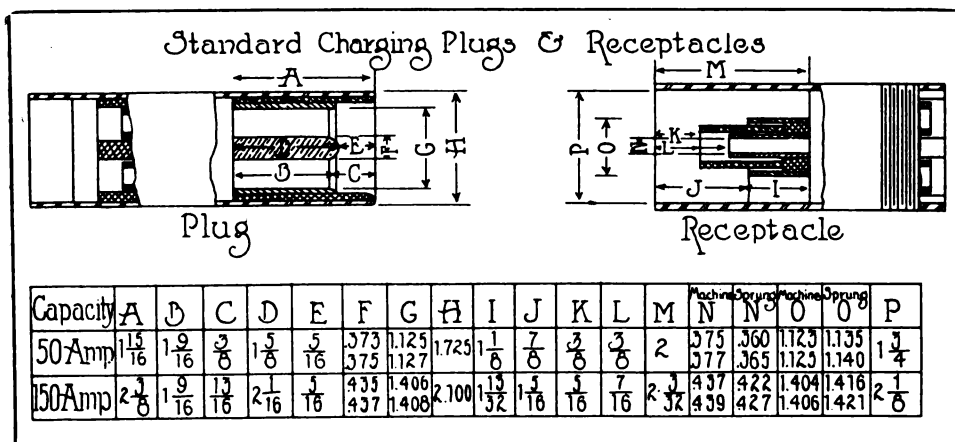
cent. overload capacity. The detail dimensions are set forth in a tabulation. The National Board of Fire Underwriters has approved plugs of the dimensions given. The association's committee has recommended that the terminals should be large enough to receive cable having a rating, according to the Underwriters' Code Table B, at least equal to the normal rating of the plugs, and that the terminals should be marked plus and minus to correspond to the polarity of the plugs. The committee is now distributing these sheets to all persons interested, to manufacturers, owners and charging stations and garages urging the prompt adoption of the standardized plugs and receptacles, and the change of polarity, both on old and new vehicles, and charging equipment, to bring about a desired uniformity. The belief is, that when the standard has been adopted and the change made as suggested, electric vehicles can be charged anywhere that electric current is made, and all delays or complications will be eliminated.

DETROIT OWNERS PROTEST.

The common council of Detroit now has before it the petition of 82 owners of motor wagons and trucks, residents of that city, who seek to bring about the repeal of the ordinance now effective, that requires the use of fenders on service vehicles. The protestants set forth that they have been unable to find fender equipment that will afford the protection required, and for this reason are unable to comply with the regulation, although they are willing to purchase fenders and do not wish to be understood as offering the petition on the basis of expense.

AS AMERICANS SAW THEM.

The members of the British Institution of Automobile Engineers have received from the Society of Automobile Engineers a unique remembrance, which will no doubt have a prominent place in the library of the organization, this being in the form of a leather bound volume that includes hundreds of press clippings relating to the visit of the English association to America late last spring. The clippings are of every character, and chronologically arranged describe the tour of the visitors, the entertainment afforded industrially, scientifically and socially, and incidentally reflect some interesting observations. The book was sent so that it was received during the holidays, being sent by the general committee of arrangements of the S. A. E.



The Detail Drawings and Dimensions of the Charging Plugs and Receptacles Approved and the Use Recommended by the Electric Vehicle Association.

MOTOR VEHICLE USE BY CHICAGOANS.

AN ANALYSIS of the records of the vehicle department of the office of the Chicago city tax collector to Dec. 24, 1913, shows that the motor vehicles have increased almost beyond belief during a period of three years and seven months, and that the number of horse vehicles has materially decreased. This is one of the first statements that has been made that demonstrates the relative use of automobile carriages, wagons and trucks and those drawn by animals. The public has generally understood how great is the demand for pleasure cars, but the supposition has been that wagons and trucks were comparatively few in number.

The city has taxed all classes of vehicles since May 1, 1910, and its record can be regarded as authentic. Prior to May 1, 1912, pleasure cars were taxed on seating capacity, and after that date on horsepower. For convenience in making comparison the record will be referred to by years, but the last period will be understood as covering seven months and 24 days, and the figures stated for this term will probably be considerably increased before the end of the full year. The number of all types of vehicles taxed for each period was as follows:

	1910-11	1911-12	1912-13	1913—
Horse vehicles.....	58,114	55,785	55,502	54,037
Pleasure cars.....	9,963	11,876	16,857	21,332
Service wagons.....	799	1,578	2,835	3,964
Demonstrating cars.....	326	490	593	614

The classification of these vehicles is of especial interest, and shows the following:

	1910-11	1911-12	1912-13	1913—
Single-horse vehicle.....	40,109	38,694	38,429	38,019
Two-horse vehicle.....	17,640	16,771	16,728	15,745
Three-horse vehicle.....	331	290	325	256
Four-horse vehicle.....	34	30	20	17
Motorcycles.....	1,838	2,778	4,112	4,819
Pleasure cars.....	9,963	11,876	16,857	21,332
Motor wagons and trucks....	799	1,578	2,835	3,964

The business of the city undoubtedly increased during the period covered by these figures, but the relative decrease of horse vehicles is shown by the following:

	1911-12	1912-13	1913—	Total
Single-horse vehicle.....	1,415	265	410	1,415
Two-horse vehicle.....	869	43	983	1,895
Three-horse vehicle.....	41	•	69	110
Four-horse vehicle.....	4	10	3	17
Total.....	2,329	283	1,465	4,112

*Increased 35. †Increase of 35 included in this tabulation.

Just what proportion of the single-horse vehicles were used for business purposes is uncertain, but it is reasonable to assume that a considerable part of the total decrease in single animal conveyances is now represented by motor delivery wagons. This is borne out by the following division of industrial machines.

	1910-11	1911-12	1912-13	1913—
Capacity				
Up to 2000 pounds.....	436	922	1,680	2,297
More than 2000 pounds.....	363	656	1,155	1,667
Total.....	799	1,578	2,835	3,964

During the period dealt with the increase of service motor wagons has been 396 per cent., while the in-

crease of pleasure vehicles has been 114 per cent., and the decrease of horse drawn conveyances has been approximately 7.5 per cent. One will note that the greatest loss has been of the two-horse teams, a very large proportion of which is used for haulage purposes, and there is practically the same shrinkage with reference to three-horse hitches, though the number is surprisingly small for a city the size of Chicago.

The tabulations show that more than 30 per cent. of all vehicles in use in Chicago are automobiles, and while it may be assumed the passenger cars are used practically to the exclusion of animals for pleasure and recreation, one can also assume that more than 90 per cent. of the animal vehicles taxed are used for service. The gain of wagons and trucks has been marked, and it is probable that the rapid increase will continue. During the unfinished fourth period the total number of taxable machines has increased more than 1000, and with this ratio of gain there is every reason to believe that the aggregate at the end of 1914 will approximate 5500 at least.

WAGENHALS TO BUILD ELECTRIC.

The Wagenhals Motor Car Company, Detroit, Mich., which has for a considerable length of time built a three-wheeled vehicle driven by a four-cylinder engine designed for light delivery purposes, has developed an electric machine of much the same type that is now being tested. The purpose is to perfect the vehicle and to produce it commercially as soon as experiments have established its construction and efficiency.

The electric machine is driven by a single rear wheel, steered by the two forward wheels, and the power is provided by a General Electric Company's motor and a 24-cell Exide battery. The capacity of the machine is 600 pounds. The mileage will depend upon road conditions, but where the highways are normal the machine is expected to make 45 miles on a single battery charge.

With capital of \$1,000,000 the A & T Storage Battery Company has been incorporated in New York City by W. C. Albers, A. L. Kull, D. B. Nally and John Splitdorf. The plans of the incorporators have not as yet been made public.

The United States Ball Bearing Manufacturing Company, Oak Park, Ill., is now marketing through its own selling organization, which is established in the general offices of the company at the factory.

The Packard Motor Car Company, following the holiday season, increased its force of workers to the normal number, several hundred men having been idle for several weeks.

THE WAUKESHA MODEL O MOTORS.

TO MEET the demand of motor truck manufacturers who prefer to use engines that have been developed and specialized rather than build their own, the Waukesha Motor Company, Waukesha, Wis., has begun the production of a heavy duty type that is designed for installation in trucks and wagons, and is suited for industrial and stationary service. The company maintains that the engine design has been very carefully worked out and that in experimental work and tests it has been found to be extremely economical and enduring. These motors are now produced commercially with the assurance of the maker that they are especially adapted for the purposes stated.

The motor is built in five sizes and it can be furnished either as the engine complete or the unit power plant, comprising the clutch, transmission gearset and pedals and control levers. The motor is known as the model O, and it can be furnished in these sizes: Cylinder bore of 3.25 inches and stroke of five inches; cylinder bore of 4.25 inches and stroke of 5.75 inches; cylinder bore of 4.25 inches and stroke of 6.75 inches; cylinder bore of 4.5 inches and stroke of 6.75 inches; cylinder bore of 4.75 inches and stroke of 6.75 inches.

For the purposes of description the 3.75-inch cylinder bore and 5.75-inch stroke will be taken, but in all respects other than proportions the motors are identical. The rating of this engine, which is regarded by the maker as being sufficiently powerful for 2000, 4000, 5000 and 6000-pound machines, by the S. A. E. formula, is 16.9 horsepower, but it will develop much greater power than this, and 25 horsepower would not be excessive. By the same formula the other sizes are rated at 28.9, 32.4 and 36.1 horsepower, but the long stroke insures that these ratings will be materially exceeded in practise.

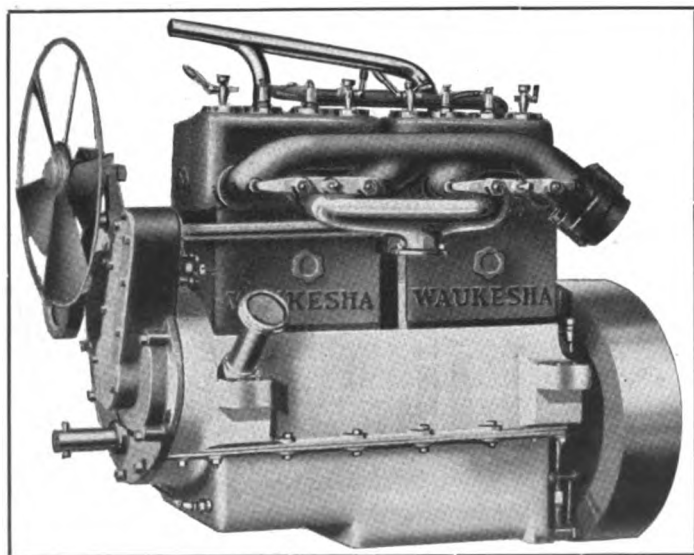
The maker claims that in conforming to the heavy duty practise of the company the motors have these distinctive qualities: Long bearings of large area,

chrome nickel crankshaft, small bore and long stroke, the "Waukesha" patented non-hunting and self-lubricating governor, great accessibility to all parts, and such disposition of the fuel charge as to afford large economy of operation.

The motor is a conventional four-cylinder, water-cooled, L head type with cylinder units cast in pairs with the water jackets integral. The cylinders are cast of a semi-steel mixture of a very close grain and the water jackets are generous in size, large cover plates carrying the water outlet manifolds. The cylinders are annealed after casting and are then rough bored and reamed, after which they are aged to insure against the development of casting strains and cracks. Following the ageing the units are ground to accurate dimensions. During the processes of finishing the cylinder is tested five times to detect possible imperfections. The pistons are cast of the same metal as the cylinders and these are turned to size and ground to the cylinder dimensions. Each piston carries two rings of the same metal as the piston, of special design, and ground and fitted with care to secure good compression. The pistons are "relieved" in the centres of the walls and three oil grooves are made in the skirt of each piston to secure even and thorough distribution of the lubricant on the cylinder and piston walls. The piston lugs are bushed to take the wear of the wristpins, which oscillate in the lugs.

The crankcase is cast of an aluminum alloy and is designed with heavy walls and ribs in the sections where stresses are imposed. The base of the case contains the oil reservoir. The supporting arms and the brackets for the magneto and the pump shaft are cast integral with the case. The crankshaft of chrome nickel steel is heat treated and has a tensile strength of 140,000 pounds and an elastic limit of 122,000 pounds to the square inch, and a shore hardness of 40-45. The shaft is so hard that it will not cut or score under extremely severe conditions of use. The shaft is carried on three bearings, the forward being 2.75 inches length, the centre 3.25 inches length and the rear 3.75 inches length, this giving a total length of 10 inches of bearing surface. At the rear end is a large flange to which the flywheel is coupled by six .5-inch bolts. The shaft is two inches diameter at the main and connecting rod bearings and the crankpins are two inches length.

The connecting rods are 40 carbon steel drop forgings, heat treated, with a split clamp small end and a four-bolt cap at the crankpin end; the caps are retained by heat treated bolts of chrome nickel steel .21875 inch diameter, these being fitted with a special castellated nut to insure effective adjustment. The connecting rod bearings are specially designed of Fahrig metal with reinforced backs to prevent distortion. These bearings are retained by brass taper headed screws and keyed on by heavy shims, adjustment being afforded



Left or Valve Side of the Waukesha Model O Motor.

series of thinner shims. The rods are reinforced to have great rigidity at the big ends. The wristpins are chrome nickel steel tube with walls .15625 inch thickness, case hardened and ground. These pins have a total bearing surface of 2.5 square inches.

The camshaft is a 20 carbon steel drop forging with the cams cut integral and the cams are ground to a master shaft. The shaft is case hardened throughout.

The valve tappets or pushrods are a roller type, and are 1.125 inches diameter. They are bored to form sleeves with walls .0625 inch thickness and are case hardened and ground. The pin is of tool steel and this and the roller are case hardened and ground, as is the adjusting screw, which is locked with a soft steel nut. The rollers and pins may be renewed when worn. The guides for the rods are of semi-steel and are carefully reamed and grooved to insure effective lubrication. These guides have a total bearing area on the pushrods of 3.25 square inches. The valves are made with alloy steel heads, are hardened and are made with long shallow recesses into which taper washers are fitted which lock the springs when placed. The valves have very large fillets, which strengthen the heads and prevent warping, and at the same time afford easy passage for the fuel gas.

The motor is lubricated by the Waukesha force feed and splash system, which has been proven in long practise to be very efficient. The oil is contained in a reservoir in the base of the crankcase, and it is drawn from this through the filter by a gear driven pump and forced through tube to the timing gears, lubricating all the bearings. The oil is fed into the base of the crankcase where it is collected in pits or pockets into which the big ends of the connecting rods, fitted with scoops, sweep at each revolution. These pockets are very deep and have no overflows. The splash carries oil to pockets that feed to the crankshaft and camshaft bearings, and the valve tappets, the tappet guides, the cylinders, pistons and wristpins and wristpin bearings. The drainage is carried into the pump and is constantly circulated. The system is so designed that the flow of lubricant is equalized and there is always a sufficient volume of oil to afford ample lubrication, and a correct level at any angle the engine can be operated.

The motor is governed by a governor of the fly ball type, which is so constructed that the spring that establishes the speed binds all the moving parts and insures simultaneous action, which, with the dash pot, eliminates all "hunting". In addition wear of the governor has a tendency to reduce motor speed. All parts of the governor are not accessible to the driver, which is enclosed and lubricated from the engine oiling system. When desired a certain speed can be established and the governor sealed. The governor can be used as a maximum speed governor or it can be set for handling a specific load. All these distinctive features are covered by patents.

The motor will deliver its maximum torque at 600 revolutions a minute, so that it cannot be driven to a speed that would be damaging. It is claimed by the

maker that during the period of experimentation, covering many months, three of these motors in two-ton trucks averaged more than eight miles to the gallon of fuel, or a total of more than 60 ton-miles to the gallon of gasoline.

GOODYEAR COMPANY'S BIG YEAR.

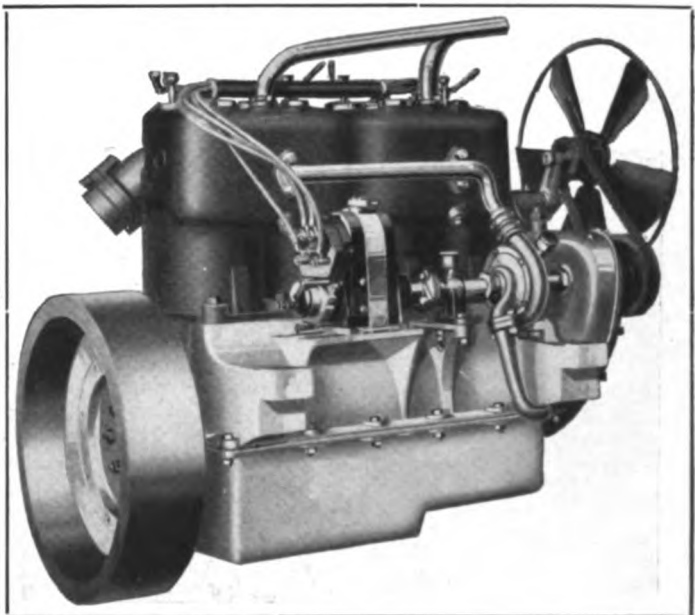
The Goodyear Tire & Rubber Company during the fiscal year of 1913 did a total business of approximately \$32,500,000, the total sales amounting to \$29,000,000 and the profit to \$2,041,000. During the year a 33 per cent. dividend was paid on common stock amounting to \$603,102. The officers of the company were re-elected as follows: President, F. A. Seiberling; vice president, C. E. Seiberling; secretary, G. M. Stadelman; treasurer, F. H. Adams.

Two Federal trucks have been recently sold to the Mexican government that are supposed to be used in connection with the field activities of the Mexican army. As two Federal machines are used for "gun-running" by the constitutionalists, so far as can be judged the chances are even.

A factory branch has been opened by the Chicago Pneumatic Tool Company, maker of Little Giant delivery wagons, at 234 14th street, N. W., Washington, D. C., which is under the management of G. C. Stevens.

Under Illinois law the Stegeman Motor Truck Company has been incorporated at Chicago, Ill., with capital of \$10,000 by D. H. Bucklan, E. E. Burkland and R. C. Flodin.

The Kissel Motor Car Company, Hartford, Wis., has appointed Clifford E. Golder manager of the truck department of the Milwaukee, Wis., branch.



Right or Pump and Magneto Side of Waukesha Model O Motor.

REAL VALUE OF QUICK LOAD HANDLING.

A MOTOR vehicle is productive of economy in proportion to the direct ratio to the method of use. The machine need not be overloaded or driven at excessive speed, but the principal purpose is to utilize it every minute that is practical. No manufacturer would believe that he could produce successfully unless his machines were in operation, and if these were operated continuously the best results would be obtained. The same principle can be applied to vehicular haulage, and where facilities have been provided that will insure quick loading and unloading trucks or wagons can be used with remarkable saving as compared with the use of animals.

An illustration of the possibilities, where practical thought is given to methods, and where the hauls are exceedingly short, is that of H. L. Beauvais of Earville, O., who is engaged in the haulage of sand and gravel used for the making of concrete for the construction of a dam in the Cuyahoga river near that place.

A water works system for the city of Akron, O., is being constructed, and the dam is to form the lower end of a large reservoir. When finished a considerable part of the river bottom will be flooded and that the dam shall be permanent and enduring concrete is the material principally used in its construction. Beauvais has a contract for supplying the sand and gravel from a large bed he controls a trifle more than a mile from the site of the dam. An enormous quantity of material will be required for the work and the sand and gravel must be transported from the bed to the dam. The concrete is mixed and made ready as near the dam as is possible and it is necessary that a sufficient quantity of gravel and sand be furnished that the work may be carried on without interruption.

Mr. Beauvais bought a Peerless five-ton truck to haul the material from the bed, and to realize the fullest value of the machine a power dumping body was installed on the chassis. The proposition was to make this truck do all the work that was necessary, and to obtain the fullest utility of the vehicle it must be kept

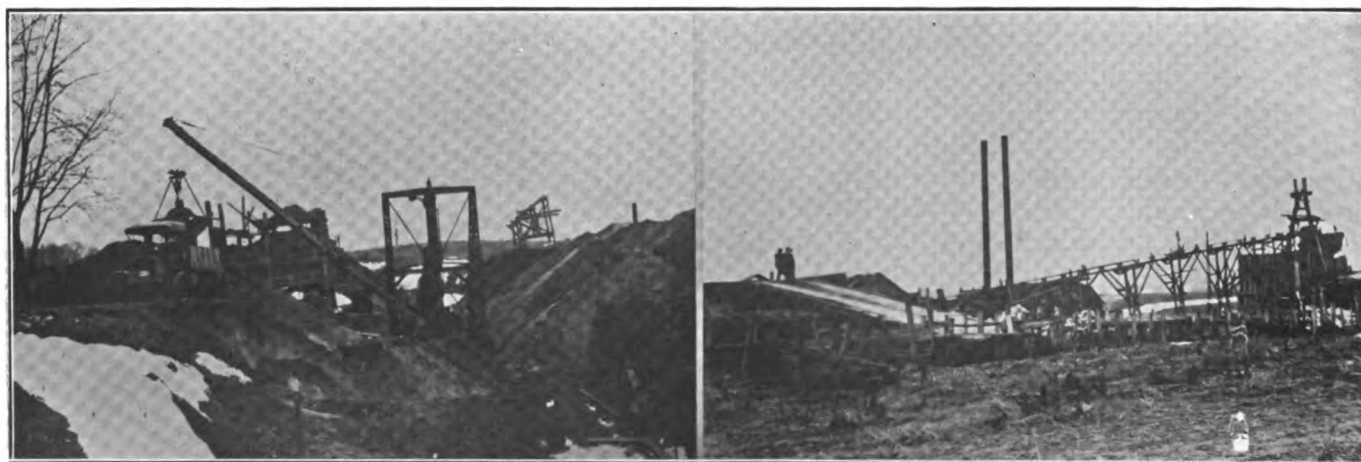
in operation with the least possible loss of time. Overloading was regarded as unnecessary and the quick discharging body was of only partial value unless it could be loaded and unloaded rapidly.

A steam shovel was installed at the gravel pit, this being a machine that operates a clam shell bucket that will lift the material and deposit it within the radius of the derrick arm. The shovel is located in an excavation and the truck can be driven along the edge of this and loaded at any convenient point. As the excavating progresses the shovel can be moved and practically the same condition for loading continued. The truck will carry four yards, weighing about 2850 pounds to the yard and about 11,400 pounds to the load a trip.

The distance from the gravel bank to the dam is approximately 1.1 miles, the highway being a comparatively poor road that descends from a bank of considerable height, as will be noted from the illustration, and after following the river bottom nearly to the dam it ascends to the plateau, there being an eight per cent. grade that requires a quick turn before reaching the elevation.

On this bank has been constructed an unloading platform, which is illustrated, as well as the plant for making the concrete. The platform and plant are in combination, the purpose being to utilize machinery and economize labor wherever possible. The platform is nine feet above the ground and this is reached by an inclined run about 50 feet long that has a grade of about 18 per cent. The truck can be driven to this platform and then from it without backing. At the centre of the platform is an opening a few inches narrower than the space between the wheels of the truck.

The truck is driven to the platform and the load dumped into the opening when the body is lifted by the screw hoist operated by the engine. Beneath the platform is a pocket with sides inclined to the mouth at the bottom, and under this is a belt conveyor 16 inches width that has a length of loaded travel of 135 feet and moves at a speed of 300 feet a minute. The



Loading Five-Ton Peerless Truck with Steam Shovel at the Gravel Bank.

Unloading Platform at Concrete Making Plant at Dam at Earville, O.

sand or gravel is deposited on the belt and conveyed directly to the concrete mixers. The conveyor is operated by an eight horsepower steam engine and on an incline of about 25 degrees it gives excellent results. The labor of handling is confined to the attention necessary for the engine, and the truck load is quickly carried where it is used in the required proportions. While this work is going on the truck is returning to the gravel bank.

The regular working day is nine hours, and in that time the truck will carry 15 loads as an average, each weighing 11,400 pounds, or a total of approximately 85 tons. In the same period it is generally driven about 33 miles. During night work, which is occasionally necessary, it has been operated with but slightly decreased efficiency. The estimate is that the machine is doing work for which nine two-horse teams and carts and nine drivers would be required, and there is no delay in the supply of material required for the mixing machines. The saving in the cost of the dam by the use of the truck is a considerable item, for W. E. Maxson, superintendent for the Amburson Hydraulic Construction Company of Boston, which is contractor for building the dam, is authority for the statement that the truck is doing at an expense of about \$16 a day the work that would cost about \$56 if horses were used, this being a saving of practically \$40 daily.

The Davis Manufacturing Company, Milwaukee, Wis., and the Rutenber Motor Company, Marion, Ind., have been admitted to membership in the recently organized Automobile Engine Manufacturers' Association. The purpose of the association is stated to be in no manner to restrict competition, but to promote the industry by the exchange of useful information that will stimulate the use of motor vehicle engines.

The demand of the factory of the Goodyear Tire & Rubber Company, Akron, O., for fabric for the manufacture of tires has been such that a night force has been set at work at the mills of the Killingly Manufacturing Company, Williamsville, Conn., owned by the Goodyear company and engaged in the manufacture of a special duck cloth used exclusively for tires.

One of the mining companies in Peru has acquired a five-ton, 50 horsepower Saurer truck, made in Switzerland, fitted with a steel dumping body. Despite the fact that the engine is required to work at an altitude of 13,850 feet, the owner reports that the machine has proven satisfactory in every respect.

With capital of \$10,000 the Direct Drive Axle Company has been organized at Columbus, O., to hold a patent on an axle that will be manufactured in that city. The officers of the company are: President, W. E. Campbell; vice president, I. H. Pleukarp; secretary-treasurer, C. O. Haines.

WANT CAMPBELL IN DUBLIN.

Manager of Boston Show Invited to Direct Civic Exhibition in Ireland.

International recognition of the capacity of General Manager Chester I. Campbell of the Boston pleasure car and service wagon shows is evidenced in the invitation received by him Jan. 27 to direct an international exhibition that will take place in Dublin, Ireland, the coming summer and autumn. The Boston exposition was originated 12 years ago, and each year the display has been larger and better from the viewpoint of the visitors, and while assumedly a local event the statement that it is a New England and Eastern Canada show does not more than reasonably represent the section of the continent from which its patronage is drawn.

The first show was directed by a committee, of which Mr. Campbell, as secretary, was the active director. The following year he was elected manager, and since that time he has been secretary of the Boston Automobile Dealers' Association and of the Boston Commercial Motor Vehicle Association and general manager of the shows organized by them. The success of these expositions led to Mr. Campbell being engaged as manager of the national motor boat shows, electrical, textile and other industrial displays in Boston and in New York and Chicago, and in every instance the results have been gratifying to the organizers.

The success of the shows has been from Mr. Campbell's ability as an organizer and the fact that he knows how to attract and interest the public. He has devoted his time and endeavors to exhibition management for years, and he is without question the best known man in New England, and his reputation for high class attractions has not only insured exhibitors generous patronage, but the people have equal confidence that the shows will have sufficient merit to justify their interest.

The invitation from abroad was cabled by the Countess of Aberdeen, from the Vice Regal Lodge, Dublin, and the exhibition will be of civic character, under the auspices of the Irish Housing & Town Planning League, of which she is president. It is expected that there will be numerous exhibits from housing and city planning associations of America, England and Continental Europe. Mr. Campbell is awaiting complete details by mail before considering the proposal, and meantime he is completing the plans for the annual pleasure car and motor truck exhibitions in Boston next month, and the fourth national textile show in April, which are under his direction.

The machinery is now being installed in the new plant of the Maccarr Company at Scranton, Penn., being removed from Allentown, that state, and in a comparatively short time the factory will be started.

VANBRUNT SELLS FOREIGN TRADE.

New York Man Will Control Distribution of Palmer-Moore Machines Abroad.

The Palmer-Moore Company, Syracuse, N. Y., maker of Palmer-Moore air and water-cooled motor delivery wagons, has made contract with H. D. VanBrunt of New York, under the terms of which Mr. VanBrunt will market its export production aside from that sold in the Canadian provinces. Mr. VanBrunt recently returned from an extended tour to Australia and countries of the Far East, and he has planned to specialize in the exportation of American pleasure cars and motor wagons and trucks. He has projected a selling organization that will consist of 15 men, who will travel in different countries, developing trade and ascertaining the needs of the people in the particular lines they are engaged in. Having direct connection with the American manufacturers he will be in a position to obtain whatever will be best adapted to the requirements of the people of any given locality, and the makers he represents will have the advantage of the constant exploitation of their machines.

Mr. VanBrunt visited Syracuse at the close of the New York automobile show, he being accompanied by William Cowles of Adelaide, State of South Australia, the latter desiring to become agent for a water-cooled delivery wagon that would be adapted to service in the locality where he does business. Mr. Cowles is of the firm of Eyes & Cowles, Ltd., a leading automobile dealer of Adelaide. He selected a chassis which has been shipped around Cape Horn, and will reach Adelaide about April 1. Mr. Cowles is very enthusiastic on the opportunities for motor truck transportation in Australia. The roads, he stated, are generally good. The distances between cities and towns of consequence are so great and the economy of motor truck freightage is so generally realized by mercantile, manufacturing and agricultural interests, that these vehicles will be used whenever possible, for with better transportation decided development is certain to be realized, and the people are concerned in whatever will be promotive. Mr. Cowles was returning, having visited the Automobile Salon at Paris, the Olympia show at London and the national show at New York.

Relative to his own plans Mr. VanBrunt says that when he left Australia in November the business conditions were good in all of the seven Australian states, though the labor party is practically in control of the government and the state and local administrations. Strikes have been numerous, but the people as a whole are very prosperous. Extreme wealth and extreme poverty are conditions rarely met with, and the conditions that stimulate vice and depravity are noticeably lacking in the cities. The intense rivalry in all things between the people of the seven states of the colony, which is at times extremely bitter, has been a decided

handicap in the development of interstate commercial relations. This condition appears to the visitor to be decidedly peculiar. Australia is gaining rapidly in population, Adelaide, the capital of South Australia, having more than 200,000 inhabitants, and Melbourne, capital of the neighboring state of Victoria, has nearly 800,000. Mr. VanBrunt looks for a very lucrative business in Australia and believes that American trade will be materially increased with the completion of the Panama canal.

COLLEGE TEACHING MOTOR LORE.

The citizens of the State of Iowa who desire to obtain motor vehicle knowledge can avail themselves of the course established by the Iowa State College, which has broadened the scope of its engineering department by the addition of instruction in automobile theory and practise. The course is necessarily elemental and abridged, but it is believed that those who desire to obtain practical information can benefit themselves materially by it. According to the plan for the present year the instructor, R. E. Davis, who was connected with the Midland Motor Company as chief engineer, is to give lectures for five days in as many cities as can be reached in the time available, and the students must arrange to take the full course to be entitled to enrollment.

WANTS MOTOR 'BUS FRANCHISE.

The Milwaukee Transportation Company, represented by T. S. Lyons, has made petition to the city council of that city for a franchise for a motor omnibus line from the city hall to the northeastern boundary, covering stated streets. The company proposes to operate 20 machines, making trips at intervals of from two to 30 minutes, charging a 10-cent fare. Mr. Lyons asks for an exclusive franchise and proposes to pay a license fee on a basis of mileage. The petitioner represents the London Omnibus Company, which is operating public service omnibus lines in London, New York, Washington and elsewhere.

SPARK PLUG MEN ORGANIZING.

A committee chosen at a recent meeting of spark plug manufacturers in New York, who gathered as the guests of A. R. Mosler of A. R. Mosler & Co., owner of the Canfield spark plug patent, will formulate plans for an organization in which will be represented practically all who have secured licenses to manufacture spark plugs under the Canfield patent. The body will be protective so far as this may be necessary and generally promotive of the industry.

The capital of the Timken-Detroit Axle Company, Detroit, is to be increased to \$3,000,000, this being demanded by the development of the business.

ADAPTABILITY OF FODEN STEAM TRUCKS.

Results of Six Months' Experimentation by New York Concern in Hauling Construction Materials, Etc.—Ton-Mile Expense of 15 Cents with Coke and Coal as Fuel.

FTER operating two Foden steam trucks for some six months, the Terminal Transport Company, Kingsbridge avenue and 236th street, New York City, feels that it is in a position to offer valuable information as to the adaptability of these vehicles to all kinds of service. The company has utilized these machines in contract haulage work, including handling of building materials, paving materials, sometimes with and sometimes without trailers. A detailed statement of expense indicates that with either the machines may be operated at a cost of 15 cents a ton-mile.

Engine and Boiler.

The Foden steam truck is built by Fodens, Ltd., Loughborough, England. It has an engine of the compound type, the steam jacketed cylinders of which have a bore of four inches, high pressure, and 6.75

long, six wide and three deep. Special reference to the arrangement of body and load will be made later. One of the illustrations shows the driver's seat and indicates some of the details of construction.

Underneath the chassis is a 160-gallon water tank, permitting a supply sufficient for a run of from 15 to 20 miles. The pump discharges through a feed water heater at the left of the engine, into which exhaust steam is led. An injector also is fitted. A steam syphon at the right of the coal bunker, just back of the driver's seat, and 11 feet of hose permit water to be taken from a brook or other source of supply en route.

Other Constructional Details.

A two-speed gear is provided, giving speeds of two and six miles an hour. Drive is by sliding gears on the crankshaft to gears on a fixed countershaft, and thence by roller chain of 2.5-inch pitch to a live rear



One of the Foden Steam Trucks and Two of the Trailers Owned by the Terminal Transport Company, New York City.

low pressure, and stroke of seven inches. The engine is fitted with the Foden high pressure gear, by means of which it is instantly converted into a double pressure, each cylinder receiving steam separately from the boiler and exhausting independently into a smoke stack. This is held to increase power in emergencies, and to make the machine more readily handled in difficult places.

The boiler is built along the lines of the horizontal five boiler and is hydraulically tested to 350 pounds for a safe, working pressure of 200 pounds.

The firebox is made large to take either coke or coal. The total heating surface of the firebox and boiler is 70 square feet.

Water Supply.

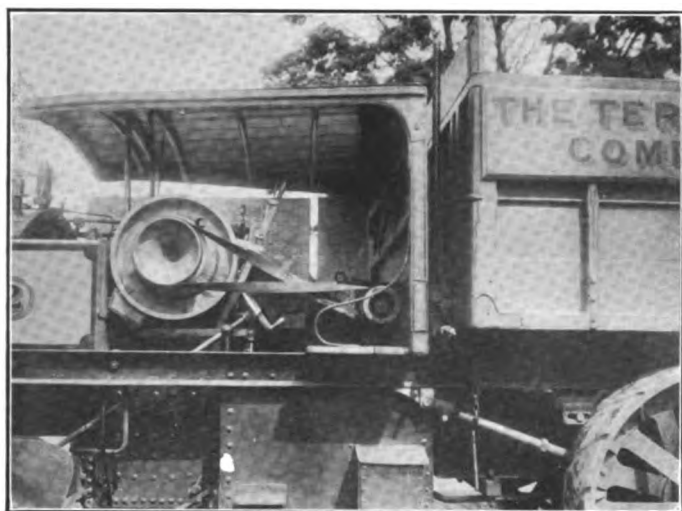
Accompanying illustrations set forth the general appearance of the Foden machine, which is rated at 15 tons, and has a load carrying platform nine feet

wide. The radius rods are threaded right and left to permit adjustment of this chain. Two sets of brakes are fitted, in addition to the use of the lever in reverse position. The service brake acts upon the flywheel and is operated by the foot, while the emergency band brake operates on a drum upon the rear axle. Steering is accomplished in the same manner as with the ordinary road roller, the front axle being pivoted at its centre.

The wheels are shod with steel tires, the rear members having broad cleats, closely spaced. Provision also is made for sanding the road to afford additional traction.

Provision for Dumping.

As will be noted, the bodies are arranged so as to be dumped, and this may be accomplished either by hand or by steam. The small illustration shows the crossed belt leading from the flywheel to the pulley on



Driver's Seat and Dumping Mechanism on Foden Steam Truck. the dumping mechanism. The body is hinged at the rear, and the load may be deposited in one place or spread as desired. The picture also indicates the method of raising and lowering the body by hand, a detachable handle being fitted to the shaft protruding between the driver's cab and the body proper.

Kind of Fuel Employed.

It has been stated that the firebox is so constructed that it will take either coke or coal. In England, where a large number of these vehicles have been operated with success for the past 10 years, the fuel most generally employed is soft coal, but there are obvious reasons why hard coal is preferable in this country.

The Terminal Transport Company has experimented with various kinds of fuel, including coke and briquettes, the latter a preparation composed largely of anthracite coal dust and tar. The engineer states that the best results have been obtained with the use of a mixture of Plymouth red ash stove coal and coke, about half and half by volume. He also states that it takes about an hour to get up steam. The bunker holds 300 pounds of coal, and for long runs, extra fuel is carried in bags with the load.

Design of Trailers.

The trailers utilized by this concern were supplied by Scannell & Nephew of London, a firm of motor engineers with which Fodens, Ltd., has a contract for this class of work. They are connected to the truck by a long drawbar with a spring at the forward end, designed to take up shocks. The trailers are fitted with steel tired wood wheels. There is no provision for dumping the trailers, although the rear ends and sides are hinged at the bottom and open outwardly.

It ought to be stated here that Foden steam trucks have been sold for so-called Colonial service in many parts of the world, and statements concerning these vehicles which have been received in this country have indicated that they were particularly well adapted for service where there were no roads, in the generally accepted use of that term. The experience of the Terminal Transport Company, according to its manager, Robert L. Niles, Jr., has been that they are not adapted for service on poor roads.

Distribution of Load.

He says it is necessary to have roads with good foundation, and he explains this statement by calling attention to the weight of the vehicle and the distribution of load. The truck is rated at six to seven tons. Ready for the load the vehicle weighs approximately 7.5 tons. Study of the accompanying illustrations will indicate that a large proportion of the load is carried by the rear axle. Mr. Niles says that the weight to which the rear axle is subjected is about 12 tons. He adds that this concentration of weight can be avoided when the use of narrow cleats and wide spacing is permissible to give traction, but the marking which results on asphalt or bituminous pavements precludes this type of driving wheel in the vicinity of New York. Fodens, Ltd., has produced vehicles of this capacity fitted with rubber tires for use in Great Britain, but Mr. Niles is of the opinion that the cost of such tires is prohibitive when trailers are used.

It has been stated that the truck affords speeds of two and six miles an hour, and while this may appear to be slow, Mr. Niles suggests that it must be remembered that ton-mileage is the criterion of effectiveness in any vehicle. The experience of the company has indicated that it is entirely practical to run slowly and draw a big load, and that the Foden is capable of 54 ton-miles an hour. A standard load with this concern is six tons on the truck and three on a trailer, although with smooth roads and easy grades a total of 12 tons on the truck and trailer has been handled advantageously. Mr. Niles says that by hauling a trailer, which he believes must be done to secure maximum efficiency from machines designed for heavy pulling, it is possible to reduce the cost a ton-mile to 50 per cent. of that of horse haulage.

Use of the Trailers.

With slow loading materials, it has been found that three trailers can be worked with success in the following manner: One trailer at either end of the route and the third on the way. By this is meant that one trailer is left at the dock, for instance, to be loaded, while the truck is hauling a fully loaded trailer to the end of the route, where it dumps its own load, picks up an empty and returns to the dock, while the loaded trailer is being emptied.

However, it is maintained by Mr. Niles that it is not always possible to utilize these trailers with success, owing to the fact that they are not reversible. With reversible, end dumping trailers, such as can now be obtained in the American market, he feels that the cost of haulage with all classes of material can be reduced under all conditions but one—a short haul with material that can be dumped. In this case, he suggests that it might take more time to manoeuvre the trailer than would be saved by its use.

Cost of Operation.

Concerning the cost of operating these vehicles, Mr. Niles says the machine will consume from eight to 16 gallons of water to the mile and from 10 to 20 pounds of fuel, depending upon the condition of the

and surface and upon the grades. An asphalt or luminous surface may double the tractive effort necessary to move the load. He adds that experiments made by the company have indicated that soft coal is best for making steam, but introduces smoke and fumes. Coke is clean, but has insufficient lasting qualities and is rather too bulky. The cheaper grades of coal and the briquettes are held by him to be absolutely worthless.

The Detailed Figures.

The ton-mile cost stated above is based on a daily mileage of 30. The figures presented below are taken from the report supplied by Mr. Niles to the treasurer of the Terminal Transport Company in his annual report at the close of 1913. They represent a monthly average, based upon the actual cost of the several items, although it is probable that there may be some variation in the matter of mileage from month to month. The report covers the cost of each item and its percentage of the total for the two Foden steam trucks and the three trailers owned by the company, and is as follows:

Average Monthly Cost of Operating Two Foden Steam Trucks and Three Trailers.

Depreciation at 10 per cent a year.....	\$84	8.3
Insurance, etc.....	25	2.4
Repairs, 10 per cent a year.....	84	8.3
Garage rental.....	25	2.4
Coal, six tons at \$8.....	48	4.7
Coke 150 bushels at 11c.....	16	1.5
Oil, 25 gallons at 40c.....	10	1.0
Waste, gloves polish, etc.....	4	.5
Permits, licenses, etc.....	4	.5
Engineers, two, 26 days at \$5.50.....	286	28.0
Helpers, two, 26 days at \$3.....	156	15.2
Manager's salary.....	200	19.6
Watchman, at \$3 a day.....	78	7.6
Totals.....	\$1020	\$100.0
Average cost a machine a day.....		\$19.60
Average cost a machine a ton-mile.....		0.15

It will be noted that depreciation is based upon a life of 10 years for the vehicles, and an allowance of another 10 per cent. is made for repairs. Mr. Niles states that it is the intention of the company to provide this reserve, whether or not it is utilized, in order to insure a life of 10 years as figured. The total repair expense for the past six months has been \$40.

By far the largest item of expense is the engineers' wages. The Terminal Transport Company believes that it is economy in the long run to place its expensive machines in charge of thoroughly reliable and competent men, and that such men deserve at least \$30 a week. Since the items of depreciation and repairs are almost entirely in the hands of the engineers, the company feels that a lower wage would mean less care in the driving of the trucks, leading to expensive breakdowns and vexatious delays.

In enterprises where haulage

is but an incidental part of the business, neither a watchman nor a manager would be chargeable to the machines alone, and the cost of haulage would be reduced to 11 cents a ton-mile, according to Mr. Niles' analysis of the figures.

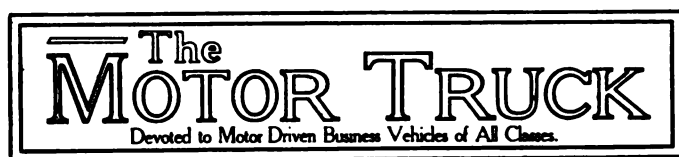
"SAFETY FIRST" AT ALBANY.

The Albany Automobile Club has launched a "safety first" campaign in Albany, N. Y., and the members have undertaken to educate the people of the city to the need of protecting themselves in the streets from traffic dangers. The club has caused large posters to be placed conspicuously about the city, it has distributed literature to the people generally and to numerous organizations in particular; it has been given co-operation by the school department and the school children have been advised by the distribution of printed suggestions, and some of the public service corporations have joined in the work. The club has undertaken to influence drivers of all vehicles to observe the laws and ordinances governing street traffic, and has sought to have the regulations enforced should there be any disposition to disregard them. The managements of the moving picture theatres of the city have also joined in the movement, and films that will demonstrate the need of attention to safety before all else have been made in Albany. These are to be shown in that city, and when they have served their purpose they will be sent elsewhere for exhibition in connection with similar campaigns.

Armored Bank Van in Paris—One of the leading banks in Paris has supplanted its unprotected horse wagon with an armored motor vehicle. The whole body is covered with steel plates capable of resisting rifle shots, and the maximum protection is afforded the driver, consistent with clear vision for driving under the traffic conditions which exist in a large city.



Driver Dumping a Load of Material from Foden Steam Truck by Utilizing Power of Engine.



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ADVERTISING RATES.

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Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

MOTOR TRAFFIC REGULATION.

Anticipated or pending legislation in many of the states ought to receive the careful attention of all owners of motor vehicles. No one will deny the need of such regulation as will afford protection to life and property and conserve the best interests of all. Were the legislators to seek the co-operation of the owners and users of machines, create their interest and consider their views, instead of regarding them as indifferent to the public welfare, a great deal of friction and antagonism might be eliminated to the benefit of all.

Taxing a vehicle will not afford a larger measure of safety nor will it insure the competency of the driver. State licenses to drive are usually granted after a perfunctory examination. Where so great responsibility lies much greater care should be taken in ascertaining the qualifications of an applicant, and driving license should be suspended pending inquiry following every accident, not to be restored unless investigation shows that driving fault did not exist. The prospect of loss of employment in a state, or in as many states as would adopt such a law, would insure care in driving that does not now obtain, and no employer could consistently object to such a regulation, as the effect would be his protection.

THE BOSTON TRUCK SHOW.

The only exclusive exhibition of power wagons of the year will take place at Boston next month. This

will be the third show organized by the Boston Commercial Motor Vehicle Association, and with the experience from previous displays every endeavor will be made to attract those who are desirous of purchasing machines or are investigating transportation problems with a view of installing motor equipment if its efficiency can be established.

No one will take issue with the statement that the New England market offers very large possibilities. The need of economic highway haulage was never more keenly realized, and turning from propositions in which there may be doubt, there are thousands in which motor vehicles can be advantageously utilized. The show will afford opportunity for gaining information and making comparisons that would not be practical, if, indeed, they were possible, and this buyers are quick to realize.

The advantages of representation in an exhibition of this character, where the qualities of machines can be demonstrated, cannot be measured by money valuation, but results will obtain proportionate to the merits of the exhibits and the ability of the salesmen. Wide publicity will be given to the show and there is no question that it will draw people from all New England. It will take place just before the opening of the season for out-door construction, when the demand for vehicles is at its height. The exhibitors will concentrate their endeavors on the exhibition, and the knowledge resulting from selling experience ought to be very beneficial.

PREVENTING TIME LOSSES.

Those who contract for or pay for special haulage are often absolutely indifferent to the delays that are resultant from failure to have freight ready when called for, or from conditions that retard unloading. Apparently the belief exists that vehicles can be kept waiting to convenience them, and that remonstrance is not justified because patronage may be bestowed wherever desired. From this point of view competition impels tolerance of conditions that are often hardships. The time of a vehicle and its crew has a distinct money value, and were waiting time paid for decided changes would undoubtedly follow the presentation of bills. Were penalization similarly exacted from the owners of vehicles for delays for which they were responsible there is little doubt that they would be as prompt as they desire their customers to be. Such arrangement as has been proposed could not be objected to, and could profitably be entered into by business men.

The proposition would not mean a loss to either interest, but would impel attention to detail that is now generally neglected. Shippers must regard time with reference to the leaving of trains and vessels, and there appears to be no good reason why local transportation, in which the delays are constant because of no systematic provision to prevent them, should not be considered by business men and haulage contractors.

ELECTRIC VEHICLE PRACTISE.

Vehicle Mileage Determined from the Rating of Battery Cells---Discharge Capacities and the Starting and Finishing Rates for Charging Some Standard Types---Use of Indicating Instruments and Specific Gravity Readings.

By William W. Scott.

THE work that is required of a battery should be very carefully considered by the purchaser of a vehicle. By this is meant that the battery should be of such size that it will supply all the energy required to perform a certain work, which may be taken as an average mileage. To illustrate: A battery may be composed of 44 cells with capacity of 380 ampere-hours, and assuming the normal discharge rate to be eight hours this would permit the use of 47.5 amperes for that period of time. If six amperes of current are necessary to move the vehicle an average mile this means that 7.916 miles an hour can be driven without exceeding the prescribed rate of current consumption, and theoretically the mileage would be 63 before the battery was reduced to exhaustion. But while an average mile is referred to, one must understand that a higher rate of current consumption is necessary when the vehicle is loaded. When battery capacity is stated it can be accepted as conservative, and when expressed in miles in manufacturers' ratings means that a full load can be carried half the distance, a half load carried the entire distance, or a 75 per cent. load carried 75 per cent. of the distance. Rating of lead-acid batteries is based on new or comparatively fresh cells, for there is a shrinkage in capacity as the cells age, and this will continue until but little energy, perhaps no more than will yield several miles operation, can be supplied from them. Such a condition is unusual, for renewal or reconstruction is generally decided on before a battery has so greatly deteriorated, because of the necessity of operating the vehicles a sufficient distance and period to insure a profit from them.

A battery should always be chosen that will do whatever work is required, and in some instances extra sizes are installed because of the conditions of work. A large battery weighs more and additional power is required to drive the machine, and while greater mileage can be obtained no larger load can be carried, or, if a bigger freight is desired, the mileage cannot be increased. This statement is made in a general way, for results may be attained that will not precisely parallel the illustrations given. One must understand that before consideration of the battery one must ascertain what facilities are available for charging, because the capacity of the feed or main line in voltage must be sufficient to afford a complete charge.

Assuming that the battery has been selected with reference to the greatest efficiency that can be determined by known capacity and estimate of work, and

that the machine is to be operated daily, provision should be made for records that will insure complete knowledge of work and operation, for these will be found of decided value. Preferably the records ought to be on forms that can be filled conveniently and which may be preserved in files or books. Electrical engineering and electro-chemistry are exact sciences, and accuracy is imperative if rule or formula is to be followed. This does not mean that exactness is absolutely necessary for reasonable success in battery operation, but the greatest efficiency can be obtained by adherence to standards, and "guessing" is very certain to lead to neglect and inferior service.

The lead-acid battery cell is rated at its greatest efficiency when the eight-hour rate of charge or discharge is maintained. The loss in capacity with the decrease of this rate has been explained. There are occasions when the amperage drawn may be very much in excess of the normal rate, but such drains are not continued for any extended periods. The makers, however, give ratings that are based on four, five, six, or eight hours, and if these are not exceeded the efficiency will be realized. This statement is made to emphasize that the nearer the battery is operated to what may be regarded as its standard of work the greater economy will obtain.

Every battery is plainly marked so that there could be no mistake made by any person using ordinary care in any work upon it, and an operator with experience in battery manipulation could, by following extremely simple rules, establish any condition and with absolute certainty reach any result desired. As a matter of fact there is no reason why an error should be made, and it is practical to expect that a required condition can be attained whenever desired.

For regular charging a standard of 2.5 volts a cell can be considered the maximum requirement, and 1.8 volts the minimum that is permitted. The product of the number of cells multiplied by 2.5 will give the line voltage necessary to obtain a full charge. Vehicle lead-acid batteries range from 16 to 48 in number of cells, and are made up in multiples of two, so that, to illustrate, the 16-cell battery would require 40 volts, and the 48-cell battery 120 volts, or three times as much. But if the line voltage is 120 there will probably be a slight loss from the resistance of the line and the cells, and the probable maximum will be 115 to 117, depending upon conditions.

The first requirement in charging is to know the capacity of the battery and the facilities available for

this work. The equipment ought to be of the best, for it is then dependable. The following tabulation is standard with the manufacturers of the different batteries specified:

Electric Storage Battery Company—Individual Cells.

Type	No. plates	Capacity ampere-hours	Discharge in Amperes for four hours	Charging rate, amperage at start	Charging rate, amperage at finish
Exide P V.....	5	48	12	12	5
Exide P V.....	7	72	18	17	6
Exide P V.....	9	96	24	21	8
Exide P V.....	11	120	30	25	10
Exide M V.....	7	84	21	20	7
Exide M V.....	9	112	28	25	9
Exide M V.....	11	140	35	29	12
Exide M V.....	13	168	42	35	14
Exide M V.....	15	196	49	40	16
Exide M V.....	17	224	56	46	18
Exide M V.....	19	252	63	51	20
Exide M V.....	21	280	70	56	22

Discharge for five hours

Hycap-Exide P V... 9	92½	18½	18	7
Hycap-Exide P V... 11	115	23	22	8
Hycap-Exide P V... 13	137½	27½	25	10
Hycap-Exide M V... 9	110	22	21	8
Hycap-Exide M V... 11	137½	27½	25	10
Hycap-Exide M V... 13	165	33	29	12
Hycap-Exide M V... 15	192½	38½	34	13
Hycap-Exide M V... 17	220	44	39	15
Hycap-Exide M V... 19	247½	49½	43	17
Hycap-Exide M V... 21	275	55	47	19
Hycap-Exide M V... 23	302½	60½	52	20
Hycap-Exide M V... 25	330	66	56	22

Discharge for six hours

Thin Exide M V... 11	127½	20½	21	8
Thin Exide M V... 13	153	24½	25	9
Thin Exide M V... 15	168½	28½	28	11
Thin Exide M V... 17	204	33	32	12
Thin Exide M V... 19	229½	37	35	14
Thin Exide M V... 21	255	41½	39	15
Thin Exide M V... 23	280½	45½	42	17
Thin Exide M V... 25	306	49½	46	18
Thin Exide M V... 27	331½	53½	49	19
Thin Exide M V... 29	357	57½	52	21
Thin Exide M V... 31	382½	61½	56	22

Discharge for 4.5 hours

Ironclad Exide P V 5	54	12	12	5
Ironclad Exide P V 7	81	18	17	6
Ironclad Exide P V 9	108	24	21	8
Ironclad Exide P V 11	135	30	25	10
Ironclad Exide M V 7	94½	21	20	7
Ironclad Exide M V 9	126	28	25	9
Ironclad Exide M V 11	157½	35	29	12
Ironclad Exide M V 13	189	42	35	14
Ironclad Exide M V 15	220½	49	40	16
Ironclad Exide M V 17	252	56	46	18
Ironclad Exide M V 19	283½	63	51	20
Ironclad Exide M V 21	315	70	56	22

Philadelphia Storage Battery Company—Individual Cells.

Type	No. plates	Capacity ampere-hours	Discharge in Amperes for four hours	Charging rate, amperage at start	Charging rate, amperage at finish
W.....	7	84	21	21	5
W.....	9	112	28	28	7
W.....	11	140	35	35	9
W.....	13	168	42	42	11
W.....	15	196	49	49	13
W.....	17	224	56	56	15
W.....	19	252	63	63	17
W.....	21	280	70	70	19

Discharge for five hours

W M.....	9	112	22.4	23	5
W M.....	11	140	28	28	7
W M.....	13	168	33.6	34	9
W M.....	15	196	39.2	40	10
W M.....	17	224	44.8	45	12
W M.....	19	252	50.4	51	14
W M.....	21	280	56	56	15
W M.....	23	308	61.6	62	17
W M.....	25	336	67.2	68	19

Discharge for six hours

W T.....	9	108	18	18	4
W T.....	11	135	22½	24	5
W T.....	13	162	27	27	7
W T.....	15	189	31½	32	8
W T.....	17	216	36	36	10
W T.....	19	242	40½	40	11
W T.....	21	270	45	45	12
W T.....	23	297	49½	50	14
W T.....	25	324	54	55	15

W T X.....	9	102	17	17	4
W T X.....	11	127½	21½	22	5
W T X.....	13	153	25½	25	6
W T X.....	15	178½	29½	30	8
W T X.....	17	204	34	34	9
W T X.....	19	229½	38½	38	10
W T X.....	21	255	42½	43	12
W T X.....	23	280½	46½	47	13
W T X.....	25	306	51	51	14
W T X.....	27	331½	55½	55	16
W T X.....	29	357	59½	60	17
W T X.....	31	382½	63½	64	18
W T X.....	33	408	68	68	20

Discharge for six hours

C.....	5	48	12	12	4
C.....	7	72	18	18	5
C.....	9	96	24	24	6
C.....	11	120	30	30	7

Discharge for four hours

C M.....	7	72	14.4	15	4
C M.....	9	96	19.2	19	5
C M.....	11	120	24	24	6
C M.....	13	142	28.8	29	7

Discharge for five hours

C T.....	7	67½	11½	12	3
C T.....	9	90	15	15	4
C T.....	11	112½	18½	19	5
C T.....	13	135	22½	23	6
C T.....	15	157½	26½	27	7
R.....	7	60	15	12	3
R.....	9	80	20	15	4
R.....	11	100	25	20	5
R.....	13	120	30	25	6
R.....	15	140	35	30	7

Willard Storage Battery Company—Individual Cells.

Type	No. plates	Capacity ampere-hours	Discharge in Amperes for four hours	Charging rate, amperage at start	Charging rate, amperage at finish
J—LBA.....	5	48	12	9½	4
J—LBA.....	7	72	18	14½	6
J—LBA.....	9	96	24	19	8
J—LBA.....	11	120	30	23½	9½

Discharge for four hours

K—LBA.....	7	84	21	16½	7
K—LBA.....	9	112	28	22	9
K—LBA.....	11	140	35	27½	11
K—LBA.....	13	168	42	33	13½
K—LBA.....	15	196	49	38½	16
K—LBA.....	17	224	56	44	18
K—LBA.....	19	252	63	49½	20½
K—LBA.....	21	280	70	55	22½

Discharge for five hours

L—LBA.....	7	70	14	13	5½
L—LBA.....	9	92½	18½	17	7
L—LBA.....	11	115	23	21½	9
L—LBA.....	13	137½	27½	26	10½
L—LBA.....	15	160	32	30	12½
L—LBA.....	17	182½	36½	34	14
L—LBA.....	19	205	41	38	16
L—LBA.....	21	227½	45½	42	18

Discharge for six hours

M—LBA.....	7	82½	16½	14½	6
M—LBA.....	9	110	22	19½	8
M—LBA.....	11	137½	27½	24½	10
M—LBA.....	13	165	33	29½	12
M—LBA.....	15	192½	38½	34½	14
M—LBA.....	17	220	44	39½	16
M—LBA.....	19	247½	49½	44½	18
M—LBA.....	21	275	55	49½	20
M—LBA.....	23	302½	60½	54½	22

Discharge for seven hours

N—LBA.....	7	64.8	10.8	11½	5
N—LBA.....	9	86.4	14.4	15½	6½
N—LBA.....	11	90	18	19½	8
N—LBA.....	13	129.6	21.6	23½	9½
N—LBA.....	15	151.2	25.2	27½	11
N—LBA.....	17	172.8	28.8	31½	12½
N—LBA.....	19	194.4	32.4	35½	14
N—LBA.....	21	216	36	39½	15½

Discharge for eight hours

O—LBA.....	7	76½	12½	13½	5
O—LBA.....	9	102	17	18	7
O—LBA.....	11	127½	21½	22½	9
O—LBA.....	13	153	25½	27	11
O—LBA.....	15	178½	29½	31½	13
O—LBA.....	17	204	34	36	15
O—LBA.....	19	229½	38½	40½	17
O—LBA.....	21	255	42½	45	19
O—LBA.....	23	280½	46½	49½	21
O—LBA.....	25	306	53	54	23
O—LBA.....	27	331½	55½	58½	25

Considering the foregoing tables it will be noted that the cells differ in ampere-hour capacity, and that the discharge rates range from four to six hours. Obviously the cells with the longest discharge period will have the greatest capacity, that is, that a cell rated at 25 amperes for six hours, or 150 amperes in all, will yield less of that capacity as the discharge is hastened, and will somewhat exceed it if the discharge is made slower than the rate stated. For this reason the rating of cells can be regarded as a standard conservatively placed by the manufacturer, which will undoubtedly be exceeded when the cells are new. But the temperature, the age of the cell, and the condition of maintenance are all factors entering into efficiency. One must remember that the lead-acid battery cell is gradually deteriorating, and the ratio of deterioration is proportionate to the care.

The cells of a secondary lead-acid battery can be charged only from a direct current, which may be primarily generated as direct, or generated as alternating and converted to direct by rectification, regeneration or conversion, but the manner of determining the condition of the charge—the energy accumulated—may be by indication of a voltmeter or by the specific gravity of the electrolyte. Of these the former method is generally used, but the latter occasionally is utilized. Specific gravity readings, however, are necessarily used to indicate the condition of the solution in the cells, and where the voltmeter is used one may say that the method is a combination of both.

In previous chapters the value of specific gravity indications has been emphasized, and further explanation is not necessary to make the facts stated clear to the reader.

The charging may be from any line that has a sufficiently high voltage and amperage, and this may be carried direct to the battery without even the use of a switch, but the switch is always utilized unless in the event of extemporized apparatus because of the greater safety and convenience. The line is connected with a charging panel or switchboard, and on this are usually the switch, the voltmeter and ammeter, and the current passes through a resistance coil or rheostat that the amperage may be varied. Occasionally wattmeters are installed on the panels for the purpose of indicating the amount of current that is used in charging. Without the wattmeter the quantity of current used can only be approximated.

The principle of charging is this: The battery has a maximum capacity rating which is the number of cells multiplied by 2.55, which will give the necessary voltage when the cell is fully charged, and assuming that a battery is reduced to the minimum permissible, which is indicated by the number of cells multiplied by 1.8, the voltage must be increased from the minimum to the maximum. This is done by connecting the charging lead with the battery and permitting the current to flow into the battery at the voltage and amperage stated. As will be noted the amperage for cells is variable, which can be ascertained by reference to

tables previously given, but the voltage is practically standard for batteries of the same number of cells, and the following table will give what may be regarded as a satisfactory approximation, although the temperature at the time of charging and the age of the battery will be factors of some importance. A new battery will show higher voltage readings than an old battery, and the variations from this influence cannot be stated with exactness:

Voltage Rates for Charging.

No. cells	Voltage at start of charge	Voltage at which amperage should be reduced
12	26	31
14	30	36
16	34	41
18	39	46
20	43	51
22	47	56
24	52	61
26	56	66
28	60	71
30	64	76
32	69	81
34	73	87
36	77	92
38	82	97
40	86	102
42	90	107
44	95	112
46	100	117
48	105	123
50	110	128

Considering these figures for a moment one should understand that they are applied to cells that require what is referred to as a full charge, and when a full charge is not needed and the reading of the voltmeter or the hydrometer shows a higher indication than stated at the beginning of the charge, that the amperage of the current should be reduced when the voltage specified is reached. That is, the battery should be given such charge as is necessary to bring it up to the maximum.

The voltage of the cells in theory should increase uniformly and all should indicate the same. A battery will be influenced by a single cell, and any condition that will result in a lessened voltage will be noticeable. In the event of a defective cell restoration is necessary. In other words, the battery cells must be in practically the same state of efficiency to obtain the fullest measure of productiveness.

When charging is done by gravity the equipment necessary is much simpler. The only indicating instrument necessary is an ammeter, and generally the charging is governed by the specific gravity readings of a pilot cell, which is selected from a centre group. The current is permitted to flow into the battery by closing a switch, and when the specific gravity of the pilot cell or cells indicates the standard at which the amperage should be reduced the reduction is made and the charging is continued, being regulated by the condition of the electrolyte. It will be evident that the charging cannot be done by following a tabulation unless the conditions were precisely the same, and obviously every battery will differ. The cells will not have precisely the same indication, and the other factors, age, temperature and other conditions, will have influence. When gravity charging is practised, how-

ever, the cells are closely observed and these will indicate with absolute certainty the condition. It is practical, however, to establish a definite standard for any battery and when this is shown in the specific gravity reading to reduce the amperage to the required rate.

All battery manufacturers recommend that charging be done where a reasonably even temperature can be assured. Engineering standards are usually based on 60 degrees Fahrenheit for the electrolyte, and this is corrected for higher or lower temperatures. Similarly engineering data are based on use of 1.842 acid for the solution, while the commercial product, almost always used for practical purposes, has a standard of 1.835. Taking a standard the battery engineer makes recommendation of a maximum specific gravity that represents the cell fully charged, and with this as a basis a tabulation is worked out that represents the required maximum at different temperatures. For instance, one manufacturer gives 1.300 as the specific gravity of his battery when shipped from the factory, and states that in practical operation it may be regarded fully charged when the specific gravity is 1.285 at 85 degrees Fahrenheit. Assuming a solution of 1.300 density at 60 degrees: The variation of temperature will vary the density from about 1.285 at 100 degrees to 1.309 at 30 degrees, or a difference of about one-third of a point in density to each degree of temperature. This variation will be in direct ratio with the density and the temperature.

It is evident that a marked error could be made disregarding the change in temperature, and while correction is practical by the application of the rough rule stated, knowing the temperature, the density, and having a standard by which the rule can be applied, complications can be avoided by keeping the room where the battery is charged at or as near as is possible to a known degree of heat. To illustrate: The approximate readings of an electrolyte that would be standard at 1.285 at 85 degrees would be 1.284 for 88 degrees, 1.283 for 91 degrees, 1.282 for 94 degrees, the density lessening up to 110 degrees, which is the critical point, and it would similarly increase as the temperature is decreased, showing 1.302 or thereabouts at 30 degrees.

Batteries, unless there is special reason, are shipped assembled and fully charged. When shipped with a vehicle the battery is charged and, unless it has been in transit for more than three days, needs no attention, but if it has been on the road for four or five days or a week, it is well to give it what is known as a freshening charge, which is given slowly and at low amperage, generally at the finishing rate, this being intended to reduce any sulphate that may have formed and to bring it to a state of highest efficiency. This charge may be stopped when the cells "gas" freely, for overcharging is to be avoided in such cases as this.

Charging had best be done by system or formula. That is, the work ought to be done in precisely the same way each day, or when the battery is charged, as

this will insure every detail being given the attention necessary or desirable. Record forms ought to be procured and provision made for filing these, so that reference to these will at all times afford useful information. These should be simple, but they ought to include the date, the number of the battery or the vehicle, the station and circuit if there is more than one machine, the time charging was begun, the starting rate of amperage, the voltage indicated at the start, readings of the voltage every half hour, the time amperage was reduced, the time charging ceased, with the final readings of both voltage and amperage, the condition of the battery as noted by the observer, and, if a wattmeter is used, the total wattage used in charging.

The battery cells are arranged in crates, each crate being a unit and removable from the battery box, and the cells are coupled by the connectors that are fitted from each positive to each negative terminal, leaving one negative and one positive terminal of each crate available for connection with other crates, and when the battery is ready for use each cell is connected, positive to negative, with the positive terminal of one end cell and the negative terminal of the other end cell connected with the power wiring. This arrangement is known as "in series", and this affords the use of the combined voltage of the cells and the amperage of any one cell. Thus a battery may be rated at 115 volts and 380 ampere-hours. Examination of the cells will show that all the terminals are designated, although the method of marking may differ. For instance, some makers use the plus + mark for the positive poles and the minus — mark for the negative. Others use red and black fibre washers for the same purpose, the red being positive, and sometimes the marks are filled with paint or enamel to insure certain identity.

When a battery is installed in a vehicle it is connected with the power wiring, which is installed so that the different combinations desired may be obtained by the movement of the controller handle, this grouping the cells so as to obtain the most efficient service with what proportion of power is desired. The battery is also connected with the charging wiring, which is coupled to the terminals of the end cells. This wiring is connected with the charging receptacle, which is installed conveniently in the vehicle, being usually inset in the frame where it is protected.

When the crates of cells are placed in the battery box and the end cells of the crates and the end cells of the battery connected the arrangement of the power wiring need not be considered. With the cells connected in series the battery is ready for charging or for use.

During charging battery cells liberate some oxygen and considerable hydrogen gas, either of which is very inflammable, and for this reason no naked flame should be permitted near the vehicle, but as good ventilation as is practicable should be insured, as this will allow the gases to escape. The battery box should be opened and the rubber vent plugs of the cells removed. Be-

charging the controller should be placed in the position, or in the charging location if such is desired, and the switches opened. The lamps should be allowed to burn and the horn or bell should not be sounded, for there is a probability of the heavier age destroying them.

The cells ought to be kept filled with electrolyte to the height recommended by the battery manufacturer, usually instructions are provided with each vehicle that specify the depth the element should be submerged. Generally the top edges of the plates should be half inch below the surface of the solution, and if solution is low, for it is constantly dissipated in charging, the level may be restored by the addition of distilled water. There can be no loss of acid unless by leakage of a jar or by slopping, and if there is need of additional electrolyte this can be provided as will be noted later on. The addition of water to the cells is known as "flushing" or "equalizing". After the battery box has been opened for ventilation the tops of the cells should be wiped of dust or any other accumulations, then the vent plugs can be removed and the condition of the individual cells determined. The water should be added to the cells before charging is begun.

Distilled water can be procured in whatever quantity desired and should preferably be kept in five-gallon carboys, which can be handled conveniently. The water can be distributed from the containers to the cells in a glass or earthen vessel that has a "nose" which will facilitate pouring, or a glass funnel may be used with the glass or earthenware pitcher. Metal vessels of any kind or of enamelled iron or steel should not be used. The vessel used should be kept clean and free from dust.

"Equalizing" is necessary only when the level of solution in the jars is low, and an interval of several days, or perhaps a week, will probably be found sufficient to be often enough to add water to the cells. One can judge much better after knowledge of the work done with the battery and observation of the conditions resulting from work and charging. But before preparing for a charge, the state of the solution should be noted when the vent plugs are removed and there be need water can be added.

(To Be Continued.)

The American Taximeter Company, New York, has purchased the Delivery Supervision Company, maker of the Recordograf, an instrument recording time, speed and distance driven, acquiring its stock, good will and patents, and it is expected will continue the manufacture of the machines, cast supply parts and maintain those now in use.

Peerless Motor Car Company, Cleveland, O., has paid its last dividend on preferred stock at the rate of 6 per cent., this being the same as has been paid by this concern.

LARGE TRUCK TIRE MILEAGE.

Union Transfer Company Gets from 12,900 to 25,300 Miles from Shoes.

The results obtained by the Union Transfer Company of Philadelphia, Baltimore and Washington, which has contract for handling the baggage and other transfer work of the Pennsylvania Railroad Company in the three cities named, has been so greatly in excess of the average service from motor vehicle tires that it is worthy of especial notice. The company operates trucks between the different passenger terminals of the three cities and these are used in all kinds of traffic and in conditions that would be regarded as at least the equal of those obtaining elsewhere. The machines are used rationally, however, and this fact alone is believed to be the reason why the tires have given such exceptional results.

A conspicuous instance is that of a truck equipped with Goodrich wireless truck tires which was placed in service in June, 1911. This machine was used constantly and the first replacement was in January, 1913, when a rear tire that had been driven 12,900 miles was replaced. The mileage of the truck was considerably increased in the next few months, for in April, 1913, when the second rear tire was renewed the old shoe had been driven 17,000 miles. The following month a front tire was taken off after it had been used for 18,800 miles, and in September, 1913, the other front tire was replaced, this having a mileage of 25,300 miles. This gave an average of 14,950 miles for the rear tires and 21,650 for the front tires. Since the renewal of the rear tires the truck has been driven 12,000 miles and the shoes have not yet reached the limit of usefulness. It is possible that they may be driven for several thousand miles.

In the opinion of the Philadelphia representative of the maker of the tires the large mileage is resultant from the driving of the machine. It has been used in good street conditions, has never been overloaded or driven at excessive speed, and the driver does not drive in car tracks. He believes that any other truck in normal service, and used in the same manner, ought to be equally satisfactory as to tire wear.

The Electric Steel Company, Indianapolis, Ind., which is shortly to erect a factory at Speedway, a suburb of that city, has engaged James M. Ryan, formerly in charge of the steel casting department of the Canadian Pacific Foundries Company, Ltd., Montreal, P. Q., as its factory manager.

The capital stock of the Bessemer Motor Truck Company, Grove City, Penn., has been increased to \$300,000 from \$100,000, and this will be used to generally develop the rapidly increasing business of the concern. Factory expansion is expected to follow in the early spring.

CAN DEVELOP ALASKA WITH TRUCKS.

Road Board Recommends Improvement of Trail Prospected Last Summer with White Wagon Because of the Material Benefit That Will Follow Road Building.

THE demand that now exists, or may be developed, in the District of Alaska for motor vehicle transportation, is a subject that has been given some attention by those engaged in the service wagon industry, and it is of greater interest at the present time for several reasons. Chief of these is the fact that the people of the district are extremely interested in development, and in this work the national government has actively co-operated. As the market there is protected by tariff and by the cost of water and rail transportation, as well as against foreign competition, there are those who may believe that Alaska can be profitably exploited because of the lack of railroads and that the rivers that are navigable can only be used for a part of the year, usually from May to October.

No motor vehicle was ever driven in Alaska until late in the summer of 1911, when Dr. Charles G. Percival took a pleasure car from Skagway to Carmack's and return, driving a part of the distance over the

track of the Yukon & White Horse railroad. This was an experiment that created a great deal of interest among Alaskans, for from October to the latter part of April the ground is frozen and as the snow does not accumulate to great depth the surface is solid and can be driven over, and there was belief that during that period of the year motor vehicles might be practical for transportation on some of the larger and more important trails.

In 1912 several motor cars were taken into Alaska, practically all of them being carried up the Yukon river on steamers and delivered to owners living in villages along the banks of that stream. Just what success was secured from them is not definitely known. Several tractors were also sent to the interior from Yukon river villages, and these are probably in service.

Last year the board of road commissioners of the district made experiment with a White delivery wagon



On Alaskan Trails with a White Truck: A, Road Work Along the Military Telegraph Trail Through a Typical Delta Country; B, Cliff Trail Through an Ice Canyon on the Coast Range; C, Arrival at the Mining Town of Fairbanks; D, Camping on the Gunecreek Flats in the Valley of the Delta River; E, Street Scene in the City of Valdez; F, Volcanic Wilderness in the Alaska Range, Through Which a Road Will Be Built.

500 pounds capacity, which was driven from Valdez to Fairbanks and return, and a summary of the report furnished by the maker of the vehicle, was given considerable publicity. The supposition may have been that this journey, and the use subsequently made of the wagon during the remainder of the season established the utility of motor conveyances in the district. The intense cold of the winter may not prevent the use of motors, and the real difficulty would seem to be starting when the temperatures are low, but the use of pleasure cars would appear impracticable, according to the report made by Lieut.-Col. Wilds P. Richardson, president of the board of road commissioners for Alaska to the adjutant-general of the United States army relative to the progress of road construction in the district for 1913. Col. Richardson speaks with facts as he has observed them, and he does not encourage motor car touring. He does, to some extent, favor the utilization of motor wagons or trucks. In the main, however, he maintains that in most of Alaska the use of wheels is now impracticable, if not impossible, and there is no reason to expect a change for a considerable length of time.

Physical Obstacles to Development.

The report that directly bears on the possibilities of vehicle use states that: "There is little of level ground in the territory except the moss covered tundra far north and northwest. The coastal region as far as Cook Inlet is extremely rugged and is wet and heavily timbered, especially on the hill slopes, the timber becoming lighter toward the interior. The valleys of the interior or central Alaska are fairly well timbered near the streams, and are also with a dense growth of underbrush, over a blanket of moss, beneath which the ground is usually frozen to great depth. These valleys are crossed in summer through the melting snow and are thawing into morass and swamp, through which travel on foot or on horseback is a slow and arduous process. As one leaves the stream valleys the ground becomes lighter, and on the hill slopes fairly good road may be found, and in a few places considerable areas of dry gravel beach exist, but nowhere is it possible to use wheels for any considerable distance, except on some sort of prepared roadway. It is due to these physical conditions more than anything else that Alaska has remained so long an undeveloped and an unknown country."

Richardson, after a reference to the work of previous expeditions to Alaska, under command of Joseph H. Herron of the Second Cavalry, and many officers, who were the first to discover the routes from the coast to the more important points, tells of the various congressional appropriations for military and post roads and of the manner in which that money was expended.

"The wagon roads constructed may be described", he says, "as good country highways intended to meet the year-round traffic of considerable tonnage. They are graded with suitable grades, crowned, ditched and

drained, and corduroyed or planked where necessary. The winter sled road is an inexpensive form of construction adapted to the requirements of winter travel in portions of the interior. The winter travel begins in early October and lasts to about the end of April. The trail differs from the winter sled road only in being narrower and with less attention given to grade and surface inequalities."

Large Cost of Road Construction.

The average cost of road construction in Alaska, Col. Richardson adds, is about 2.5 times as great as the cost of similar work in the United States, but this difference, he prophesies, will gradually be reduced, largely by the results of the work itself, and by other improvements in transportation conditions, and as the country becomes better supplied.

"The benefits derived from this work", he continues, "are most marked, although the roads constructed so far constitute only the beginnings of a proper road system for the territory. Data in the office of the road commission show the cost of transporting freight and supplies during the year over the roads built by the commission at the prevailing rates to have been \$1,243,735. It is estimated that this amount of freight would have cost, based upon the rates prevailing in the various localities before these roads were constructed, \$3,385,412 had these roads not existed. The saving thus shown as directly due to the construction of these roads amounts to \$2,141,677, a sum not far from the total amount expended on the road and trail system in the territory, or about 16 per cent. of the mineral production of Alaska for 1912. It is doubtful, however, if anything like the amount of freight here involved would have been transported without the roads, and the indirect loss to output and development cannot be easily estimated.

"The business of mining involves the transportation of a large amount of tonnage. As noted in last year's report, there passed over one short road in the Nome district during the summer of 1912 15,000 tons, representing a saving to the shipper of \$5 per ton over the rate prevailing before the road was constructed. This road paid for itself nearly eight times in six years.

Practical Test of Motor Trucks.

"Although the board makes no pretense of having built roads adapted for automobile traffic, machines are used under the ordinary summer conditions about Juneau, Fairbanks and Nome. Several trips were made with machines during the past summer from Fairbanks to Chitina and to the coast at Valdez. The road commission placed a field truck of three-quarter ton capacity, of the type being experimented with by the quartermaster and medical corps of the army, on this road during the latter part of the summer and fall for the purpose of trying out the machine for supply and maintenance work, and to test the availability of the road for such travel. The truck left Valdez July 28 and arrived at Fairbanks Aug. 6; left Fairbanks Aug. 9 and arrived at Chitina Aug. 15; left Chitina Aug. 16, returned as far as Gulkana, thence back to

Valdez, arriving Aug. 19. The distance covered was 922 miles, making about 50 miles per day. The car while running averaged between eight and nine miles an hour. In some stretches as high as 18 miles per hour was made, while in others progress was slow. In some instances the car had to be helped through soft spots on rather heavy grades, but this was not actually necessary for a total distance of a mile throughout the whole length of the road. The president of the board came with the machine from Fairbanks to Chitina, and the engineer officer from there back to Gulkana and out to Valdez. The truck has done some good work on the road near Valdez since.

"This road from the navigable waters of the Tanana to the coast is 419 miles in length, including the Willow Creek-Chitina branch. It crosses two mountain ranges, also numerous rivers and glacier streams, several of which remain to be bridged. It is estimated that an expenditure of an average of \$1500 per mile would improve it to the condition of a very fair automobile road, capable of sustaining any traffic likely to pass over it. Maintenance cost will always be rather high, principally on account of the cutting banks and shifting channels of all streams fed by glaciers. The improvement of this route to the condition mentioned above, with a systematic plan of maintenance and with a regular mail service established over it in summer as well as winter will, it is believed, be of very great benefit toward the development of the territory. Mail could be delivered in Fairbanks in seven to eight days from Seattle, as against an average of 20 or more days by the river route, as at present.

National Appropriations Necessary.

"For this work and for improvements and extensions of the road system in other parts of the territory, all greatly needed, some specific enactment of Congress seems necessary. This maintenance, of necessity, means a slight improvement in the condition of the road from year to year."

In the opinion of the board of road commissioners the physical conditions in Alaska call for an excess proportion of wagon roads, compared to railroads, over that found necessary for systematic transportation development in any part of the United States.

"Our board", Col. Richardson concludes, "specifically disavows any intent to set forth views in opposition or discouragement to railroad construction in the territory under proper limitations, but, after several years of careful observation and study of the land transportation conditions and of the natural inducements to development and to settlement which exist, is convinced that no rapid or general development will follow the construction of trunk lines of railroad to the interior unless preceded or accompanied by the construction of numerous wagon roads and trails as feeders, and even then the development will be slow. As the territory develops the demand will be for a multitude of short roads between the deep sea channels of the coast and the streams of the interior, with certain trunk roads leading from the interior to the coast."

ANTAGONISTIC LEGISLATION.

In practically every state where the legislature is in session there is reason to believe that measures more or less antagonistic will be presented, and these are certain to have the approval of a sufficient number, at least, to insure enactment in the absence of concerted action by the owners and users of motor trucks and wagons. Where a bill is regarded as a party measure it has the strength of organization to agitate for its passage, and when advocated as public need there is apparently no reason why it should be opposed, unless those who will be affected can present sound argument to show that it will be inimical to business interests.

One of the conditions that will militate against the success of those who own or use machines is the general lack of organization. In some states the business interests are represented to a considerable extent by clubs and associations, but in others the only possibility is to arouse a sufficient number to oppose whatever legislation may be proposed. Experience has taught the necessity of having the leadership of men who are aggressive and yet diplomatic, and men of this caliber usually have business interests they cannot well afford to neglect.

Permanent organizations of motor truck owners are not only desirable, but are necessary. Legislation is but one consideration. There are numerous conditions that could be investigated and remedies recommended, and these require constant attention if practical results are to be obtained. The pendency of bills in legislative bodies may be a need for immediate activity, but there is every logical reason why associations should be formed and their endeavors concentrated for the benefit of the members.

The branch of the H. W. Johns-Manville Company at Toronto, Ont., is now located at 19 Front street, East, where it has a store and warehouse with about 35,000 square feet of floor area. This expansion is necessary to meet the demands of increased business.

The capital of the Long Manufacturing Company, Detroit, Mich., maker of radiators and other motor vehicle equipment, has been increased from \$300,000 to \$400,000. The business of the concern will be correspondingly increased.

E. A. Williams, Jr., has been made assistant general manager of the Gramm Motor Truck Company, Lima, O., succeeding Harvey L. Hooke, who has been placed in charge of the plant of the Garford Company at Elyria, O.

The Mora Power Wagon Company, Cleveland, O., has been placed in the hands of Frank H. Adams as receiver. Whether or not the company will continue has not as yet been decided.

COMMERCE 1000-POUND DELIVERY WAGON.

ECIALIZING a single vehicle, the Commerce Motor Car Company, Detroit, Mich., produces a very wagon of 1000 pounds capacity that is mainly by the maker to have qualities that adapt it for great variety of service, while its design and construction are such that it can be operated with a very measure of economy. The machine is offered on the market at a very moderate price and it has a simplicity of operation that recommends it to those who desire to secure dependable equipment at what can be regarded as minimum expense.

The company was established three years ago for the purpose of developing and building vehicles that would be in general demand and supply the need of those who used single-horse wagons, but who sought to utilize motor wagons to serve longer routes and larger numbers of customers, and to minimize time in delivery and increase the area of the section in which business was transacted.

One of the engineering propositions considered was the character of power plant that would have sufficient, but not excess, power, and the application of energy so that it could be ample in practical service under all conditions that could be normally met with. Simplification of construction, that labor in care and maintenance be minimized, was another important consideration and quite as necessary was a margin of safety which would insure endurance.

Practically Developed Machine.

In the choice of motor a type with a long stroke was decided on because of the greater efficiency at low speeds, which would also permit of fuel economy at all times, and a friction form of power transmission was adopted, as this would allow the use of the engine at practically its greatest productiveness under all of the extreme variations of speed. By this it was that this combination afforded a sufficient power for a vehicle of this capacity and insured economy of operation, besides having the additional merit of being extremely simple.

The Commerce wagon was developed in a very simple manner. The first machines built were sold in Detroit and worked where they could be carefully observed and later on a selling organization was created in different sections of the country. To-day the company has agencies in many places where the machines are used, and owners have been given satisfactory attention at all

times. The friction transmission of power has been amply demonstrated to be efficient, and the

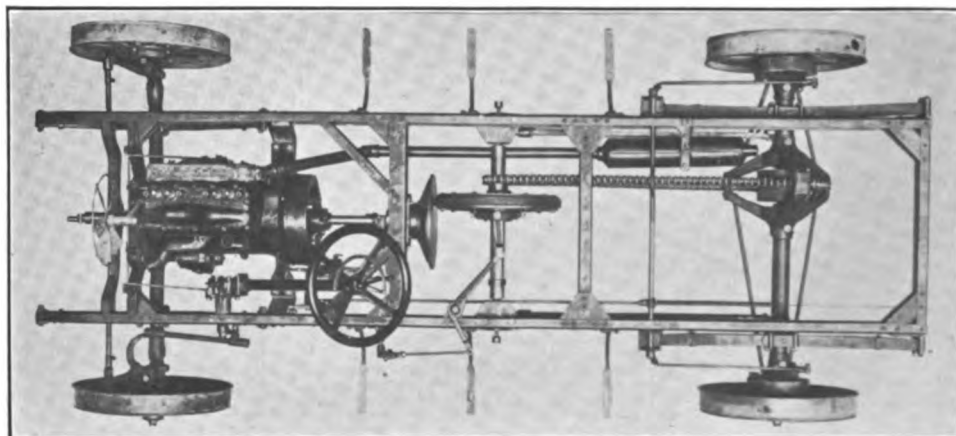
claim is made that Commerce machines have climbed grades of 60 per cent., which is far greater than would ever be attempted by any operator. The power plant has been continued after an experience of three years, it having been found equal to every requirement.

The motor is a Northway production, a four-cylinder, water cooled, L head type, with the cylinders cast in bloc. The casting is an excellent quality of fine gray iron and is cast with the water jacket integral, the entire length of the water jacket being open, this permitting careful clearing of the spaces. The entire block is covered with a cast plate, in the centre of which is the large water outlet manifold. The plate is retained by a series of cap screws. The upper half of the crankcase is cast with the cylinders, and this carries the three main bearings, these being of ample length. The lower half of the crankcase contains the oil reservoir and the web in which the oil is collected for the splash lubrication.

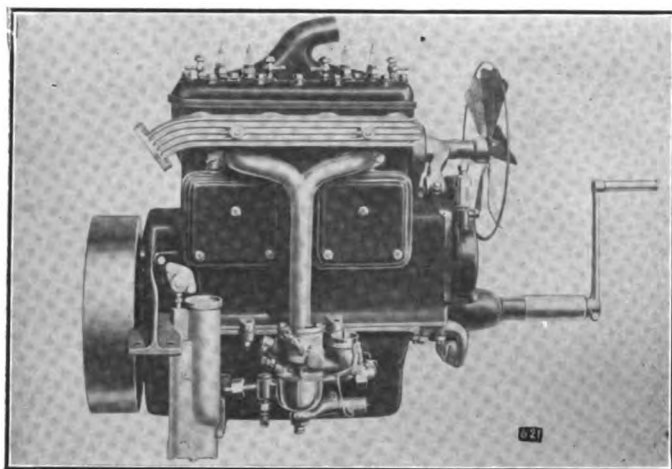
The rear supporting arms of the motor are wide and are webbed to afford strength, but the forward end of the engine is carried on a forging bolted to the forward end of the upper section of the crankcase, this forging being pivoted at the centre so as to afford a three-point suspension, eliminating all stresses from chassis distortion. The base of the motor may be removed readily for examination of or work on the main or connecting rod or camshaft bearings. The cylinders have a bore of three inches and stroke of 4.5 inches, this having a rating of 14.2 by the S. A. E. formula, but the engine is claimed to develop in excess of 20 horsepower because of the bore to stroke ratio of 1:1.5. The valve mechanism is protected by cover plates that are retained by studs and nuts, these being accessible and convenient when removal is necessary.

Combination Lubrication System.

The motor is lubricated by a combination of force feed and splash, the oil being drawn from the reservoir by a plunger pump that is driven by a worm mounted on the camshaft, the pump capacity being regulated by a screw and nut placed close to the filler



Top View of the Chassis of the Commerce Delivery Wagon, Showing the Friction Form of Power Transmission and the Extreme Simplicity of Construction.



The Intake Side of the Four-Cylinder, Water-Cooled Motor Used in the Commerce Delivery Wagon Chassis.

cap. By this pump the oil is forced to the main bearings and the timing gears, and the remainder of the motor is lubricated by splash from the sweep of the connecting rods in the pits in the pan in the bottom of the crankcase. The engine is cooled by a belt driven fan and a thermo-syphon circulation of water through the water jackets and the large radiator, there being a free flow of the liquid under all conditions of operation.

The ignition is by a Bosch magneto with a fixed spark. It is maintained that with this form of control the motor can be driven to capacity and the speed ratio varied as may be necessary without overworking or abusing it, and that the engine cannot be made to knock or pound, no matter what the demand upon it. The carburetion is by an automatic float feed type that is said to afford a satisfactory mixture at all engine speeds.

The flywheel carries a fixture into which the forward end of the driving shaft is fitted, this end telescoping slightly. This end of the shaft is rectangular. The rear end of the shaft is carried in a large bearing mounted on the centre cross frame member. This member is strengthened by braces and gusset plates. The bearing maintains the alignment of the shaft and on the rear end of the shaft is coupled the driving wheel, this being a heavily ribbed disc with a face smoothly finished. The wheel has a slightly longitudinal movement in the chassis, this movement being controlled by a pedal. This driving wheel always revolves at engine speed.

Friction Transmission.

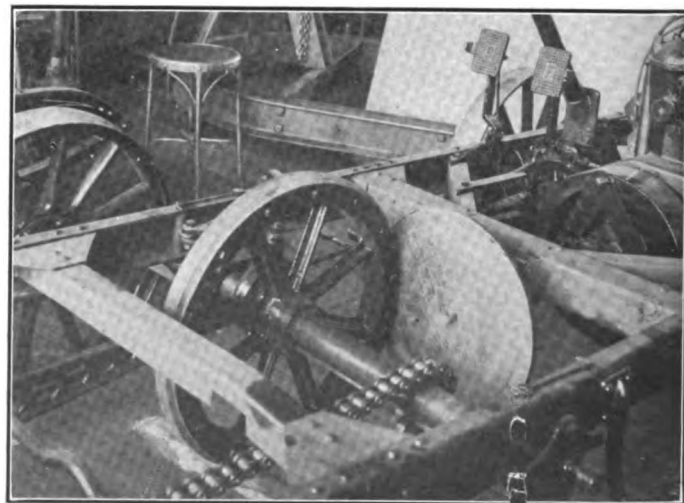
Mounted on a cross shaft that is carried in heavy bearings on stout brackets is the driven wheel or disc, the centres of this shaft and the main driving shaft coinciding. The driven wheel can be moved transversely in the chassis frame on the shaft for the full diameter of the driving disc. The rim of the driven wheel is faced with a sectional ring of fibre. The driving shaft and driving wheel may be moved longitudinally and either contacted with or removed from the driven wheel. The driven wheel may be located at any point within the range of movement on the splined jackshaft. When placed between the centre and the

left edge of the driving wheel the normal forward motion of the chassis is obtained, and when placed between the centre and the right edge of the driving wheel (right and left being with reference to the driver's position in the seat) the reverse of the motion is located. The speed of the driven wheel is entirely dependent upon its position between the centre and the edge of the driving disc, and it may be any ratio desired, minimum at exact centre and increasing until maximum is attained at the outer edge. With position the same at either side of the centre of the driving wheel the reverse or forward motion of the jackshaft is identical, and for that reason, and the fact that reverse is not desired to be fast, the extreme reverse position is approximately but a third of the radius of the driving disc.

The movement of the driven wheel is controlled by a hand lever that may be set by a dog that meshes with a notched quadrant and released as desired by pressing a release incorporated with the grip of the lever. Power is transmitted from the jackshaft to the rear axle by a chain that is fitted to sprockets, the one on the jackshaft and the other in a housing containing the differential gear in the axle, the differential being supported and protected by a heavy spider. The axle is strengthened by truss rods. The rear axle is a live type with the shafts carried in housings on large roller bearings.

General Chassis Details.

The chassis frame is a four-inch pressed steel channel section having five cross members, one forward of the motor, the second supporting the forward end of the engine, the third carrying the main driving shaft bearing, the fourth back of the jackshaft, and the fifth at the rear end, each having large gusset plates and reinforcements. The frame is supported on semi-elliptic springs, the rear set being outside of the frame and shackled at either end. The drive is through adjustable radius rods. The forward axle is tubular, having specially reinforced steering knuckles and arms. The wheels are artillery type, 12 spokes, and either



The System of Friction Power Transmission of the Commerce Wagon, Showing the Driving Disc and the Driven Wheel, Jackshaft and Chain.

32 by 3.5-inch quick detachable pneumatic or 34 by 2.5-inch solid tires are installed at option of the purchaser, the former being advocated by the maker. The drag link is fitted with double springs at either end and the steering gear is an irreversible worm and split nut type. The drive is left side with a throttle lever on top of the hand wheel. The movement of the driving wheel and the operation of the service brake are obtained by operation of pedals, the brake being applied by expanding shoes in drums on the rear wheels. The reverse of the driven wheel is used for emergency braking.

Much care has been taken to insure endurance. Hyatt roller and New Departure ball bearings are used throughout, with large ball thrust bearings where necessary, and ample provision has been made for lubricating all wearing parts. The fibre ring face of the driven wheel can be removed and replaced in a half hour at a cost of \$3.75 for material. These will endure from 3000 to 12,000 miles in service. The driving chain may be adjusted conveniently when needed.

The chassis is equipped with four body types by the makers, these being an open express with flare boards, express body with standing top enclosed by curtains, a full panel body with rear doors or end gate, or a stake platform. With the standard bodies the loading space is 64 inches length, 42 inches width, and with the enclosed bodies the height is 52.5 inches. The tail gate is 22 inches height. The wheelbase of the chassis is 102 inches and the speed is from 15 to 20 miles an hour, as may be recommended by the maker.

The driver's seat will accommodate two persons. The chassis are fitted with fenders and running boards, a tool box being carried on the left running board. The equipment includes dash and tail combination oil and electric lamps, windshield, electric horn, storage battery, pump, jack, kit of tools and tire repair outfit.

The working force of the Goodyear Tire & Rubber Company, Akron, O., has been increased from 6500 to 8000, the addition being necessary by the growing demand for the products of the company.

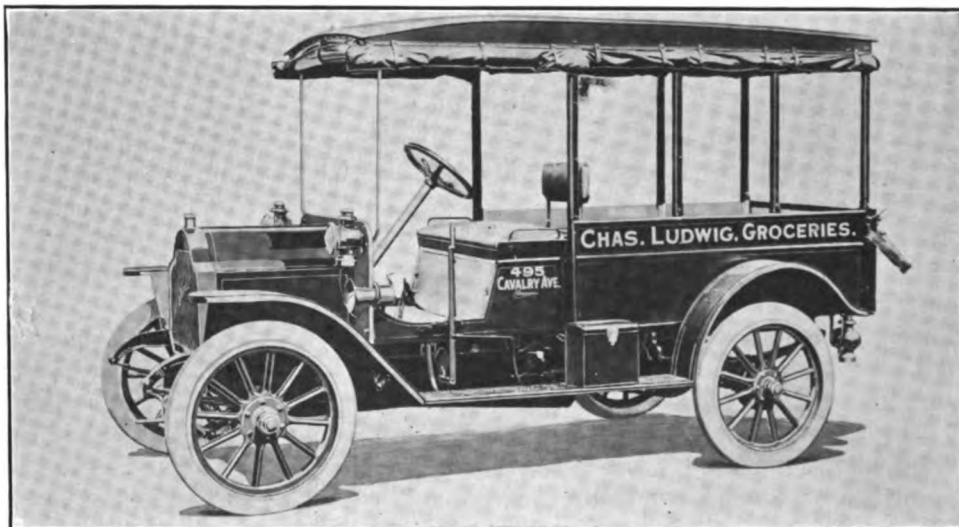
In January the working force of the Peerless Motor Car Company, Cleveland, O., was increased about 500. The company expects to considerably increase the production of its truck department.

More than 100 motor wagons and trucks were placed in service in Manitoba during 1913, and it is believed that this number will be considerably increased during the present year.

EDUCATE THE BUYER.

One fault that can be accredited to practically every motor vehicle salesman, and in this the responsibility primarily rests upon the manufacturer of wagons and trucks, is the assumption that a purchaser can utilize a machine to its greatest value. As a matter of fact very few men, especially those who purchase one or several units, can grasp the necessity of using their equipment every minute that is possible, and those who do realize this need are generally handicapped by methods that were used with horses.

Many instances have been noted where the owners of machines failed to obtain anything like the service that was practical, if ordinary thought were given to the work. Most men will gratefully accept advice, but rules cannot be generally applied, and for this reason attention must be given to any particular work and principles adapted. Salesmen cannot be expected to have qualifications that fit them for supervision, but it would be possible for a man with broad knowledge



Commer Delivery Wagon Chassis Fitted with a Standard Type of Body Adapted to the Service of a Grocery Dealer.

to make suggestions that would be helpful, and to assist in making such changes as would be desirable or necessary to obtain the fullest benefit of the machines.

The Sternberg Manufacturing Company, Milwaukee, Wis., has increased its capital to \$250,000 from \$100,000. The factory has been increased by an addition 150 by 100 feet, and with the facilities it now has the company is prepared to build 225 vehicles this year, this being an increase of about 50 per cent. of the 1913 production. The company is about to build a 2.5-ton vehicle that will have a worm drive.

The agency for the Wagenhals delivery wagons has been established with the M. C. M. Company, Cambridge, Mass.

Frank L. Roberts & Co., Boston, Mass., has been made agent for Velie motor trucks.

ADAMS TRUCK DESIGN STANDARDIZED.

THE Adams Bros. Company, Findlay, O., is now building three sizes of service wagons, these being of 2000, 3000 and 4000 pounds capacity respectively, and these are constructed practically to the same design, there being variance only in the dimensions of the components, and, of course, the completed chassis. The company has been engaged in manufacturing for many years and its policy has been always conservative. In building machines the purpose has been to produce only what can be regarded as thoroughly dependable, and the designs have been carefully tested and tried to prove dependability and endurance.

The company has standardized its constructions and has produced machines that are adapted for service in widely differing conditions, there being abundant margins of safety, sufficient power for all requirements, and the material has been carefully selected. The selling organization of the company has been developed with much care and wherever the agencies have been established the attention given to the users of Adams trucks has been such as to insure satisfaction and continuance of service.

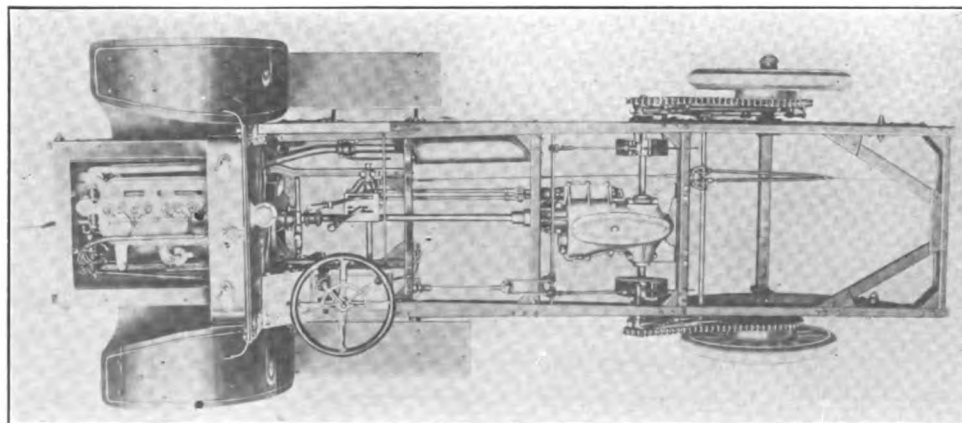
The vehicles are constructed of high class material. For instance, the motor is a Continental, the jackshaft and transmission gearset are a Warner construction, the axles are Timken, the steering gear is a Ross, the universal joints are Spicer made, and these components are incorporated with the purpose to obtain machines that are extremely simple, are accessible for examination or work, and the specialized parts can be depended upon from every point of view.

The Continental motors used are a block, water-cooled, four-cylinder, L head type, that of the 2000-pound wagon having a cylinder bore of 3.75 inches and stroke of 5.25 inches, which is rated by the S. A. E. formula at 22.5 horsepower, and is conservatively claimed by the maker to develop 30 horsepower. The motors for the 3000 and 4000-pound wagons are identical, having cylinder bore of 4.125 inches and stroke of 5.25 inches, these being similarly rated at 27.25 horsepower, but claimed by the maker to develop 35

horsepower. These engines are standard productions and are widely and favorably known. They are regarded as developing their maximum capacity at 1000 revolutions a minute. The motors are carefully tested and are sent out with the guarantee of the maker that they are factory perfect and reliable from the viewpoint of service.

The cylinders and pistons are carefully made, the crankshaft and camshaft are large and are carried in ample bearings, the connecting rods are generous in size, and the bearings are constructed with a view to securing long wear. The valve mechanism and the timing gears are designed to endure long service without material wear and the valves are enclosed to insure protection against abrasion. The motor bearings are of nickel babbitt carried in bronze cages. Accessibility is carefully provided for, and work can be done with the minimum of time. The motor lubrication is by a circulation of oil drawn from a reservoir in the base of the crankcase and carried through a sight feed gauge mounted on the dash and thence distributed by one lead of tube to the timing gears and by the other to the rear main bearing. A positive driven plunger pump carries the oil through the tube and the overflow is drained from the rear main bearing and the timing gear case to pits in the bottom of the engine case, into which the big ends of the connecting rods sweep. This insures effective lubrication of all the moving parts of the motor, and the oil in excess of the requirements of the pits flows into the reservoir and is filtered before it is again circulated.

The engine is cooled by a circulation of water, a large pump of the centrifugal type, driven by an outside shaft, forcing it through the liberal water jackets and a vertical tube radiator that is located back of the motor and incorporated with the dash. The radiator is cooled by a draft of air caused by the fan-bladed flywheel during the time the engine is operating. The radiator is a vertical tube construction and it is mounted on flexible supports so that it is not affected by the movement of the chassis frame. This location affords full protection for the radiator and permits free access to the motor from sides and front when the sloping hood of French type is raised. The ignition is by an Eisemann magneto with automatic spark advance that is controlled by the speed of the engine and requires no attention from the operator. This control governs the engine perfectly. The carburetor is an automatic float feed type that is economical of fuel and af-



Top View of the Ton Chassis, Built by the Adam Bros. Company, Findlay, O.

fords a satisfactory mixture at all engine speeds.

The clutch is a dry disc construction that is always positive in operation and engages easily. The engine and clutch are mounted in a sub-frame that is so supported that the power plant is not affected by the stresses of the chassis frame, and this frame carries the shafts of the centre control levers. The main driving shaft has two universal joints between the clutch and the gearset. The gearset and the jackshaft are assembled as a unit, the gearset being a sliding gear selective construction, having three forward speeds and reverse, and the case is supported at three points. The jackshaft is floating, the outer ends being carried in sturdy hangers that give certain support, and on the shafts, inside the chassis frame, are the 10-inch drums with three-inch faces of the service brake.

The chassis frame is a pressed steel channel section five inches width, and this is built with numerous cross members and sturdy gusset plates and braces. The forward end of the frame is "necked" to permit full swing of the wheels in steering. The springs are semi-elliptic throughout. The forward axle is an I section and the rear axle is rectangular, both being of ample proportions. These are fitted with 36-inch diameter wheels for all machines, and the regular equipment is with demountable tires. The drive is at the left side and the steering gear is an irreversible type with a large hand wheel. The control levers are at the centre, at the right of the driver. The fuel supply is controlled by a foot accelerator. The emergency brake is operated by hand lever, the shoes expanding within drums 13.5 inches diameter and 2.5 inches width on the rear wheels, and the service brake bands contract on drums on the jackshaft, being actuated by a pedal. The bearings of the transmission gearset and the differential are F. & S. ball construction, and the wheels are fitted with Timken roller bearings throughout.

In these general characteristics the machines do not vary aside from dimensions or proportions of components. The 2000 and 3000-pound vehicles are built with 121 or 136-inch wheelbase, and tread of 56 inches, at the option of the purchaser, and the 4000-pound machine has wheelbase of 140 inches and tread of 60 inches. The 2000-pound chassis has 3.5-inch solid tires forward and four-inch tires rear; the 3000-pound chassis 3.5-inch solid tires forward and 3.5-inch dual tires rear, and the 4000-pound chassis four-inch tires forward and four-inch duals rear. The lightest machine is governed to 15 miles an hour, the intermediate size to 14 miles, and the largest to 11 miles an hour in stock designs, but these speeds may be varied by changing the sizes of the sprockets. With the 2000

and 3000-pound chassis the maximum body length back of the driver's seat with 121-inch wheelbase is 108 inches, and with 136-inch wheelbase 132 inches. The 4000-pound machine has a maximum body space of 138 inches. The chassis is sold with a seat for the driver having capacity for two persons and upholstered in black leather. A single cushion is furnished, but a single or dual lazy back is installed at the option of the purchaser. The chassis is equipped with oil dash and tail lamps, horn, oil can, tool kit, set of wrenches and jack. Either long or short wheelbase chassis are furnished at the list price. Painting is done when required by the buyer at standard prices for the work.

REORGANIZING ITS FACTORY.

The Kentucky Wagon Manufacturing Company, Louisville, Ky., which builds the Urban electric wagons and trucks in addition to an extensive wagon and carriage production, has completed the reorganization of its manufacturing and selling departments with the purpose of greater efficiency and economy. The changes have not reduced the productiveness of the plant, but have consolidated departments and better directed endeavors, and the result is expected to be a considerable increase in business.

A body building department has been established in the factory of the Buffalo Electric Vehicle Company, Buffalo, N. Y., which is in charge of E. E. Deniston, and which is now prepared to design, construct, finish, repair and restore vehicle bodies of any description. The company will build a line of stock bodies, but will produce special work to the specifications of those who desire it.

After a connection with the company for 11 years, E. F. Russell, factory manager for the Locomobile Company of America, Bridgeport, Conn., has resigned that position and will take a rest before associating himself with another enterprise. Mr. Russell has not decided his future plans.



Two-Ton Adams Truck in the Service of the American Bed Company, St. Louis, Mo.

ELECTRIC TRACTORS BIG ECONOMY.

Saving of More Than 50 Per Cent. Obtained by the Substitution of the Machines for Mules in Short Hauls of Timber in a Mammoth Louisiana Lumber Yard.

By A. L. Dixon.

YOU take the New Orleans Limited from New York to New Orleans, then the "midnight" over the Santa Fe to Lake Charles, La. Here you get a cup of coffee and perhaps a boiled egg before taking the local for Nitrim. From here you go to Elizabeth by auto, reaching there in time for supper at the one hotel in what is practically the heart of the yellow pine forest.

Most people would call Elizabeth nothing but a lumber camp and in some respects it is, but it contains one of the most up-to-date lumber mills in the South. Manager R. M. Hallawell and Electrical Engineer James Hill have made this an electrical plant throughout. They are firm believers in the "juice", and if there is no electrical apparatus on the market to do their work, they either make it themselves or have some manufacturers build it for them.

The plant of the Industrial Lumber Company has a daily capacity of about 300,000 feet, which means that it must cut over about 20 acres of land a day. Six large freight engines and 75 flat cars are used to move the logs in from forest to mill. About 1000 hands are employed, nearly 50 per cent. of these being negroes. Efficiency is the watchword from the felling of the trees to the moving of the lumber in the yards by the new electric "mules". Even the bark and stripings from the side of logs, which in most mills are carried to one end of the yard and burned, are at this mill run through a "hog" (a large electrically driven high speed cutter), which shreds the material, and

from here it is conveyed to turpentine boilers or vats, where the turpentine is extracted from the wood by a process of steaming. This is but one indication of efficiency.

Lumbering with Power Equipment.

The trees are sawed down, cut in half and then pulled from the forest to the side of the track by a huge steam derrick, which can pull four logs from four different directions at the same time. From the side of the track the logs are loaded on the freight cars by a mechanical loader which travels on the standard gauge track. The train of loaded cars is then run back to the mill, where the logs roll by gravity into the mill pond. From here they are carried to the mill by an endless chain system.

About 25 per cent. of the mill's output goes to the timber docks, where it is shipped abroad or to American users requiring heavy timber. The dry kilns take about 15 per cent. The lumber is piled on the stacks and put through a planer. The moving of this lumber required about 20 mules and a corresponding number of men, and it was to displace these that the electric tractor was built.

Description of the New G. V. Tractor.

While the tractor in question was not exactly a new proposition for the General Vehicle Company, this is the first time, to the writer's knowledge, that an electric tractor has been adapted to operating conditions of this kind. The general specifications called for something which would handle quickly from two to four tons of lumber; something which would load and unload very quickly and yet be simple in operation and inexpensive to operate, at least from the standpoint of labor. Freedom from fire risk was also a consideration. The requirements were met by building a tractor of the following specifications:

Chassis rating, two tons; battery, 44-17 G. V. lead; motor, General Electric 1026-85 V.; controller, S-35; wheelbase, 54 inches; frame, four-inch rolled steel channel; wheels, artillery type on Timken bearings; tires, front, 28 by four inch; rear, 28 by 3.5 inches, dual; counter-shaft, housed type on Timken bearings; brakes, internal ex-



Electric Tractor Equipment of the Industrial Lumber Company, Elizabeth, La., Used in Handling Stock in the Yard.

pansion on rear wheels; springs, half elliptic, front and rear.

As will be noted from illustration, the battery is mounted on the top of the chassis, the driver's seat is at the rear of the battery, the controller is at the driver's left hand, while the brake lever is operated by his right foot and the bell by his left foot. The cradle is supported by a steel extension from the chassis frame and rests on a substantial revolving block held to the supporting members by a king bolt which passes through.

The lumber is first loaded on the standard two-wheel lumber dolly and is connected to the tractor by backing the tractor under the lead, a chain being thrown around the lumber back of the first crossbar on the dolly and in turn attached to the end of a cable which passes through a guide bolt near the king pin and around the drum of a standard Sprague hoist. The driver presses a lever on his left and the hoist operates the cable which tightens the lumber to the dolly and holds it securely to the rear bolster.

In moving lumber from the mill to the lumber stacks, the tractor has a capacity of 7.5 round trips (2400 feet each) an hour, towing an average of 1500 feet of lumber, or 3.375 tons. In this work one tractor replaces five mules and three men.

Five Miles of Tramways.

This big mill has about five miles of tramways, which tramways run from the mill to all parts of the different yards. Tramways are from 16 feet to 20 feet wide and are floored with three-inch timber. At the mill the tramways are about 20 feet from the ground, sloping to about four feet at the opposite end of the yard. The lumber is worth \$13 a hundred board feet and costs \$5 a hundred for laying. These figures are important, as the mules' shoes necessitated the renewal of this lumber every three years at a cost of \$25,650. Obviously rubber tires will show a big saving in this item alone.

After the lumber is dried it is moved from the lumber stacks and dry sheds to the planing machines and then loaded into freight cars located from 60 to 1000 feet away, either by hand or by the tractor. This work is considered very hard on the mules and difficult for the truck as the hauls are very short and the roads tortuous. The truck has to go between the planers and in other narrow places and into the drying sheds, where it is necessary, sometimes, to back down a long narrow aisle. It is in this class of work that the tractor shows the largest saving, due to its flexibility of operation in the smaller spaces and that it may be loaded and unloaded quickly.

In such work one tractor displaces seven mules and five men, making 13 round trips per hour with 1100 feet of lumber a trip. The average distance covered a round trip is 2000 feet. In transferring lumber from the dry kiln to the dry sheds, work can be done with one tractor in two hours, that will usually take all day working a pair of mules.

The following analysis of the cost of operating with the G. V. electric lumber tractors and mules is of decided interest, the three tractors and six men doing the work for which 16 mules and 20 men were required.

Analysis of Operating Cost.		Mules	Tractors
Investment:			
16 mules at \$225 each.....	\$3,600		
20 sets harness at \$25 each.....	500		
20 two-wheel dollies with shafts at \$25 each.....	500		
3 electric tractors with (G. V.) batteries at \$2900 each.....			\$8,700
Stable, grain, horse, blacksmith shop, etc.	3,000		
Garage, charging apparatus, etc.....			1,000
Total.....	\$7,600		\$9,700
Fixed Charges:			
Interest	\$228		\$291
Depreciation	1,140		1,020
Fire insurance	100		87
Total fixed charges per year.....	\$1,468		\$1,398
Operating Costs:			
Renewals of batteries (every year).....			\$867
Renewals of tires (every year).....			600
Renewals of chains, gears, etc.....			375
Feed, shoeing, stable help, etc., at \$20 per month per mule (16 mules).....	\$3,840		
Labor at \$1.75 per day.....	10,500		3,600
Repairs to tramways.....	8,550		4,275
Total operating costs per year.....	\$22,890		\$9,717
Total costs per year.....	\$24,358		\$11,115
Saving per year by using electric tractors.....			\$13,243

No current has been figured in the operating costs of the three tractors as the amount used is not considered of any consequence. Assuming that a mill were to buy current from the central station at four cents a kilowatt-hour the cost of same would not average over \$200 a tractor, or \$600 in all.

Operating costs of tractors are given with G. V. conservatism, as the figures include battery, tire, gear and chain renewals each year. The load is towed, not



Mammoth Yard of the Industrial Lumber Company, Showing the Tramways and the Stock Piled in Grades of Quality and Size.

carried, and this should favor tires and other parts which show rapid depreciation in heavy haulage.

From the above it will be seen how that one special application of the electric commercial vehicle has resulted in a substantial saving to the manufacturer in question. It is an open secret that the tractor and the trailer offer many advantages in present day trucking, and I believe we shall see many more of these special applications of the electric.

POSTAL WAGONS DO GOOD WORK.

The first official statement as to the results obtaining with motorized vehicles in the service of the government postoffice department is contained in the annual report of J. A. Edgerton, purchasing agent for the department, filed with the postmaster-general at Washington. This report contains the following: "Heretofore all vehicles have been rented under contract. On Jan. 20, 1913, my predecessor issued an advertisement for motor vehicles and on March 3 an award was made to 13 contractors for an aggregate of 100 machines. This award was afterwards declared invalid by the controller on the ground that on the date mentioned there was no appropriation available out of which said purchases could be made. Subsequently a special committee was appointed to investigate and standardize vehicles for the service, being directed among its other duties to inquire into the relative cost of purchase and rental of motor cars. This committee reported favorably on the purchase of 41 machines, 20 being of the four-wheeled and 21 of the three-wheeled type. Such purchase was subsequently made. The investigation is still in progress.

"All of the four-wheeled machines are now in the service and while reports have been necessarily meager the indications thus far are that a marked saving will be shown as compared with cars under rental. This is especially true of motor cars employed in parcel post delivery".

The McIntosh & Seymour Corporation, with capital of \$2,200,000 has been organized to succeed McIntosh & Seymour Company, builder of steam engines, at Auburn, N. Y., and will build Diesel oil engines of different sizes for motor vehicles and stationary power plants. The company is made up of American and Swedish capitalists and the latter interests have the right to build Diesel engines in Sweden by the Hesselman system. The company has a strong engineering corps and it has affiliations with several large financial houses.

A building one story in height, 120 by 140 feet, of reinforced concrete, is being constructed at the plant of the Timken Roller Bearing Company at Canton, O., and will shortly be ready for occupancy.

G. P. Kurtz has been appointed agent at Washington, D. C., and Baltimore, Md., for Garford trucks.

WANTS OHIO LAW AMENDED.

The proposition has been made to the Ohio legislature by Governor Cox that the Warnes law, which has in part been declared unconstitutional, be amended so that the revenue received from the registration of motor vehicles in excess of the expenses of maintaining the registration bureau of the state, be placed to the credit of a fund to be devoted to the improvement of the state highways. The Warnes law provided that this surplus be transferred to the general fund, and this was the basis of the suit to test the constitutionality of the measure. The Ohio Automobile Association has assumed the attitude that the registration fees are in the nature of a tax rather than amounts sufficient to maintain the registration department, and any proposed change in the statute that does not make substantial reduction in the fees will be opposed in the legislature and later, if passed, will be fought in the courts.

New service stations have been established by the Eisemann Magneto Company with the Philadelphia Magneto Repair Company, 1429 Spring Garden street, Philadelphia, Penn.; H. G. Zimmerman, Linden and Walnut streets, Harrisburg, Penn.; P. Melchoirs Machine Works, 1218 Howard street, Omaha, Neb.; Archer-Wiggins Company, Sixth and Oak streets, Portland, Ore.; Storage Battery Service Company, 1525 Broadway, Seattle, Wash.; Bissinger's Magneto Exchange, 1611 Prospect avenue, Cleveland, O.; McCarthy Bros. & Ford, 41 East Eagle street, Buffalo, N. Y.; Auto Supply Company, 42 South Second street, Memphis, Tenn.; Charles Rehl & Co., 1312 14th street, N. W., Washington, D. C.

The Kentucky Court of Appeals, sitting at Frankfort, Ky., has declared constitutional the provision of the Kentucky state law that exempts from registration the vehicles of non-residents who pay registration fees or license taxes in the states in which they reside. This case was that of the City of Newport, Ky., against Merkel Bros. of Cincinnati, O., which used motor trucks in serving its customers in Newport and vicinity and refused to pay a license fee in Kentucky. When legal proceedings were instituted the company secured an injunction in the circuit court of Campbell county that prevented a fine being imposed by a police court judge pending a determination of the constitutionality of the law.

The Falls Machine Company, Sheboygan Falls, Wis., has begun the manufacture of a new model engine that is catalogued as "F", which is designed for hard service. It has small cylinder bore, long stroke and presents several distinctive features.

The Moreland Truck Company, Los Angeles, Cal., has appointed S. W. Merritt, formerly of Detroit, Mich., engineer of the production of its factory.

PHILADELPHIA NEEDS MOTORIZED EQUIPMENT.

Investigation Results in Recommendation for Immediate Purchase of Modern Fire Apparatus--- Municipal Garage Plan---Chicago Considers Street Conditions.

IF THE plans of George D. Porter, director of public safety in Philadelphia, are brought to a successful conclusion, manufacturers of motor fire fighting equipment will have a chance to bid on about \$600,000 worth of work. Mr. Porter has received the assurance of Chairman Connelly of the councils' finance committee that the appropriations requested to put the fire department upon an up-to-date basis, in point of equipment and other necessary features, will be passed without objections from the councils.

Director Porter states that after 15 months of careful and detailed investigation, he is compelled to report that the Philadelphia fire department is in an antiquated condition, and that it is from five to 10 years behind that of many other cities. He maintains that \$2,870,000 is needed to modernize the department and bring it to an equal footing with others.

The director further recommends that 34 of the old style fire engines be replaced immediately by motor driven pumping apparatus. He shows that the need for these engines is acute, and estimates the cost of this equipment at \$350,000. The total value of the apparatus now in use is placed at \$246,933.50, of which the motor driven equipment is represented by \$66,189. There are 17 motor vehicles now in service, and 11 others have been contracted for at a cost of \$58,000. These latter will be delivered within the near future.

There are 16 aerial trucks, of which one is of modern construction. Of the large number of combination hose wagons, nearly all are reported in bad condition and only two are motorized. There are 14 fuel wagons, or tenders, all of which are horse drawn and the majority are held to be beyond repair. Director Porter has recommended that these be replaced by eight motor trucks.

Police Patrol for Portland—The police department in Portland, Me., has taken possession of its new patrol wagon, the chassis for which was made by the Pope Manufacturing Company, Hartford, Conn. The body work was by the Soule-Smith Company of Portland. The equipment includes a stretcher, medical and surgical outfits, etc. The first machine, which was of the same make, was purchased three years ago

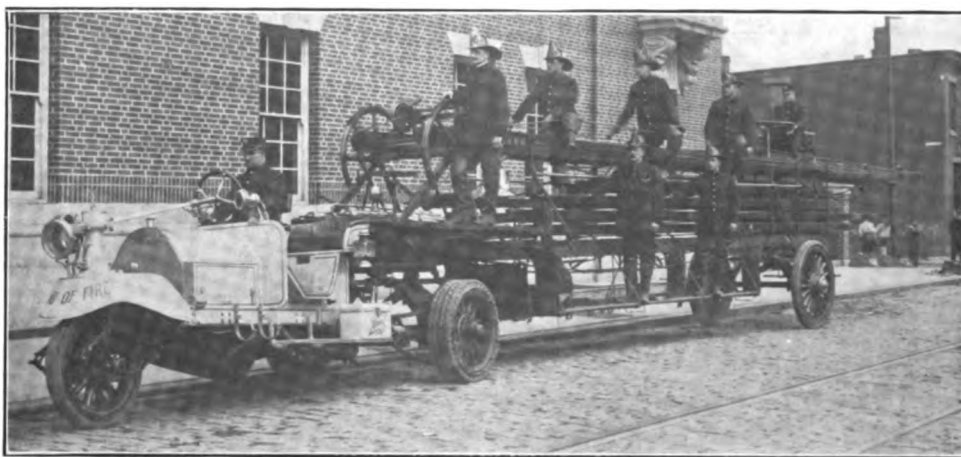
and has covered 27,000 miles in service and has given excellent satisfaction in every respect.

WANTS MUNICIPAL GARAGE.

Mayor of Worcester Has Interesting Plan for Handling City's Automobiles.

Mayor George M. Wright of Worcester, Mass., in his annual address before the city government took occasion to recommend the establishment of a municipal garage, to house all of the automobiles owned by the city departments with the exception of those used by the police, and possibly the emergency cars of the water department. His plan is somewhat novel in several respects.

He holds that municipal automobiles should event-



Knox-Martin Tractor Attached to Hook and Ladder Truck in Service with Philadelphia Fire Department.

ually be standardized to not more than three or four makes, one for five passengers, one for medium weight and one for an inexpensive light car, all being adapted to the work of the superintendents, inspectors and foremen, as well as for viewing by committees of the city council. These cars, he feels, should be available at all times, and should be kept in a modern garage, owned by the city, and cared for in the most businesslike manner.

In establishing a municipal garage, he desires that all automobiles be marked "City of Worcester", and numbered. None of them is to be assigned to any particular department. They are all to be for the use of any department which may need them, and for such use each department is to be charged at an hourly rate as nearly as possible at cost.

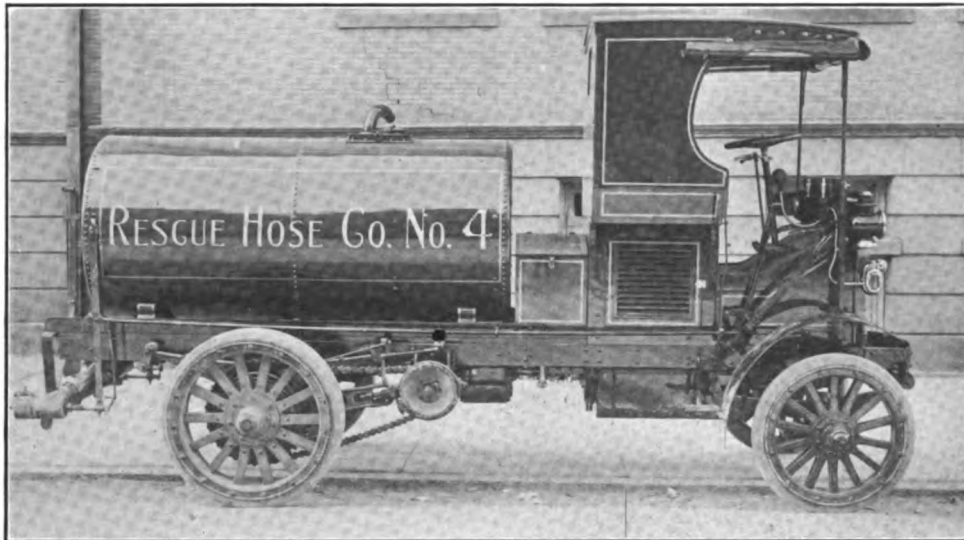
The mayor holds that there are many advantages

in the plan, chief among which are: The employment of experienced repair men and drivers, the purchase of supplies at a reduced rate, and a general improved efficiency. He believes that the purchase of supplies in bulk, repairs made by the city repair shop and the gradual supplying of cars of uniform type with interchangeable parts, as the present cars outlive their usefulness, will result in the saving of many dollars of the taxpayers' money.

STAMFORD'S MOTORS EFFICIENT.

Saving in Property Losses Sufficient to Pay for Investment Many Times Over.

With the investment of \$25,000 for motor driven fire fighting equipment during the past three years, the city officials of Stamford, Conn., believe that they have placed the fire department in that city on the list of the most efficient in the country. In addition,



Tank Wagon Supplied by Martin Carriage Works for Street Sprinkling in Lebanon, Penn.

it is maintained that the machines have been enabled to save property loss sufficient to pay their original cost many times over.

The equipment of the department consists of a Locomobile combination chemical and hose wagon, purchased in May, 1910; an American-La France pumping engine, purchased in November, 1911; a Pope-Hartford chief's car, and a second American-La France pumping engine purchased last year.

In 1910 the Locomobile machine answered 100 calls, in 1911 154, in 1912 159 and in 1913 111. During the past year it was withdrawn from service for a complete overhaul at a cost of \$1000. The first pumping engine was called upon to work all night in freezing winter weather soon after it was installed, and was as fresh as ever when called to answer an alarm the next day. In 1912 it answered 90 alarms and, in 1913, 66. The experience with these two machines is held to have been such as to justify the purchase of the two added last year.

MARTIN STREET SPRINKLER.

Chassis Details of Equipment Recently Produced for Service in Lebanon, Penn.

An accompanying illustration presents the tank wagon recently supplied to the Rescue Hose Company No. 4, Lebanon, Penn., by the Martin Carriage Works, York, Penn. This is designed for sprinkling the streets and provision is made for operating the sprinkling apparatus from the seat. The construction follows standard principles throughout and the completed vehicle presents an attractive appearance.

The equipment is installed on the regulation model E chassis produced by the Martin concern, which has a rated load capacity of 4000 to 5000 pounds. The motor is a water-cooled unit of the T head type, with bore of 4.25 inches and stroke of five, giving a rating of 28.9 horsepower under the S. A. E. formula, although the maker claims it will develop 35. Lubrication is by gear pump.

The clutch is a multiple disc, and the transmission is a Brown-Lipe built in a unit with the Timken jackshaft. Final drive is by chain. The rear axle is a Timken-Detroit, rectangular, 2.25 by 3.625 inches, with 2.75-inch spindles. The front axle is an I beam, 2.25 by 3.375 inches, with 2.125-inch spindles. The springs are semi-elliptic all around, those in front being 42 inches long by 2.5 wide and the rear members being 50 inches long and 2.75 wide. Two sets of brakes are fitted, the service on the jackshaft and the emergency on the rear wheel hubs.

The frame is of structural steel channel with wood insert, well braced and bolted together. The wheels are of wood, fitted with 36 by four-inch single tires in front and 40 by 3.5-inch dual in the rear. The wheel-base is 135 inches and the tread is 61 inches in front and 65 at the rear. With full load over hard, level roads, the speed is held to be 15 miles an hour. The driver is at the right.

Motorcycles in Fire Service—A number of firemen throughout the country are utilizing motorcycles in answering alarms. A notable example is the department in Fresno, Cal., one company of which is well supplied with these machines. Chief H. L. Stanton, Norwich, Conn., finds a motorcycle with sidecar attachment a very satisfactory vehicle, in that it places him at the scene of the blaze ahead of the other members of the department. The two-wheel mount has been used with success in many foreign countries.

REPORT INDORSES TRUCKS.

Investigation of Street Conditions in Chicago Reveals Their Advantages.

Following an investigation, lasting from April 21 to Oct. 13, 1913, the commissioner of public works and the civil service commission of Chicago have placed before the city council an interesting report concerning the street department. As a result, it is recommended that provision be made in 1914 for the purchase of at least two five-ton trucks for hauling crushed stone and material for street repair work and the use of motor driven vehicles in street cleaning work.

The report finds that every 100 horses litter the streets and alleys of the city with one ton of refuse during a working day of eight hours. This amounts in the course of a year to 493,934 cubic yards, or about 50 per cent. of all the refuse annually removed from the city streets, exclusive of garbage and ashes. Carrying out the argument, the report states that the total cost of removing street rubbish during 1912 was \$1,916,217; therefore, if 50 per cent. of the refuse is attributable to horses, the city would be some \$1,000,000 richer if there were no horse drawn vehicles.

Several important conclusions may be drawn from the facts given: First, that the substitution of motor vehicles for horse drawn vehicles would reduce the cost of street cleaning, lessen the wear of street pavements and help materially to decrease the city death rate; second, the use of motor trucks by the street cleaning department would effect further savings in cost of street cleaning and ash and garbage disposal; third, that the elimination of horses would preserve street pavements, and fourth, that replacement of macadam pavement by more permanent pavement would lower the cost of street cleaning and maintenance.

Referring to street repairs, the report makes the important observation that "where the cost of repair and maintenance is equal to or even greater than the annual interest cost on new work, it is more desirable that new pavement be laid wherever possible." The average cost of repairing and improving 55 miles of macadam country roads within the city limits is estimated at \$750 a mile. This represents six per cent. interest on \$12,500 a mile.

In a section of the report devoted to motor trucks, there is an analysis of the relative cost of hauling by horse drawn vehicles and motor trucks or tractor. A table prepared by R. T. Dana, member of the American Society of Civil Engineers, shows savings by self-propelled vehicles ranging from four per cent. for hauling two miles with load, to 14.7 per cent. for 10-mile hauls.

Toledo Issues Bonds—In order to motorize its entire fire department, the city of Toledo has sold to the banking house of R. L. Day & Co., Boston, \$200,000 of bonds. It was at first intended to motorize the depart-

ment gradually and to pay for the change from the regular budget, but the council finally decided to issue bonds for the purpose. No definite plans have been made public concerning the steps to be taken in supplying the necessary machines, but with the funds now available for the purpose it is assumed that bids will be opened for several new pieces of apparatus in the near future.

NOVEL CONTRACT PLAN.

Pierce-Arrow Machines Win Award in Recent Contest Evolved in Chicago.

In order to forestall any criticism of impartiality, the bureau of engineering of the department of public works in Chicago adopted a new method in awarding the contract for four trucks purchased recently. Twenty truck salesmen were invited to submit vehicles to be judged on the following basis:

General:	Points
Price	10
Service facilities	9
Inspection and testing of parts and material.....	7
Results of test run	5
Responsibility of manufacturer.....	9
Comparative cost of repairs.....	4
Design and construction:	
Motor	12
Clutch	4
Transmission gearset	4
Final drive	10
Axles	5
Frame	5
Springs	3
Wheels and size of tires.....	5
Brakes	4
Steering gear and arrangements.....	4
Total.....	100

Under this plan the lowest bidder was marked 10 points, and the other bidders in inverse ratio to their price. The test run covered 53.4 miles in a specified time, and this included about two miles of very muddy road. The inspection included a thorough technical examination of the whole mechanical construction, also of the gasoline and oil consumption and other items entering into the cost of operation, and was made by a technical board not in the employ of the city.

As a result of this plan the contract was awarded to H. Paulman & Co., Chicago agent for the Pierce-Arrow Motor Car Company, Buffalo, N. Y., maker of Pierce-Arrow worm driven trucks.

In the Market—The following cities are considering the purchase of motor driven fire fighting equipment: Sheboygan, Mich.; Harrisburg, Penn., appropriation of \$25,000; Auburn, N. Y., Chief E. J. Jewhurst recommends additional apparatus; Middletown, N. Y., appropriation of \$8500; Holley, N. Y., combination wagon; Wheeling, W. Va., mayor agrees with Chief E. T. Rose in urging that department be motorized; Pecos, Tex.; Ithaca, N. Y.; Rochester, N. Y., 85-foot aerial ladder; Middletown, N. Y., combination wagon; Auburn, Cal., combination wagon.

STREET TRAFFIC CONDITIONS IN LONDON.

Effect of Motor Vehicles and Tendency Toward Congestion---Trucks Play Important Part in Recent Belgian Show---General News from Foreign Countries.

CONSIDERATION of traffic conditions has been carried somewhat further in foreign countries than in America, if full credence be given to the statements emanating from the large centres. Those who have had opportunity to study the situation maintain that the traffic of London is regulated more carefully than anywhere else in the world. This is the result of necessity, in a measure, since London is the largest city in the world, and even casual knowledge of the congestion existing in other large cities would suggest that special steps must be taken to prevent such congestion as would mean total inability to traverse the streets.

It is assumed that approximately 250,000,000 journeys were made during 1913 on the trunk railway lines within the metropolis of London. The local railway companies supply figures which necessitate the

local additions and improvements, is practically identical with that of a century ago—more especially with reference to the main roads radiating out of London. It is largely due to the introduction of the more rapidly moving mechanically propelled vehicle that it has been possible for this increased traffic to pass through the streets in their present condition.

London has recognized that the monetary loss to the commercial world is of importance, to say nothing of the number of accidents to persons in the streets. The people of London have not been content to await the activities of the authorities in the matter of bettering conditions, and, among others, the traffic branch of the Board of Trade has been engaged for six years in taking a tariff census, by means of which it has been possible to determine many points at which congestion is likely to occur. As a result of this annual census it has been found that the liability toward congestion is becoming more accentuated each year. At present this traffic branch is at work upon a scheme for diverting traffic from these danger points.

But, while the introduction of motor vehicles has had a tendency to prevent congestion, on the one hand, it has been the means of adding to the possibilities in this direction on the other, from the fact that there has been gradual withdrawal of a large amount of traffic from the railways to the roads, as the economy of this type of transportation has

been appreciated. Ninety-four per cent. of the passenger vehicles met in London are motor propelled. As yet, only 12 per cent. of the so-called trade vehicles are of this type, but there is a general consensus of opinion as to their practicability and utility, and the gradual extension of their adoption to the exclusion of the horse drawn vehicle is regarded as well assured in all directions.

An accompanying diagram presents the comparative results between the 1912 and 1913 census of the traffic branch of the London Board of Trade, and shows the gradual increase in the number and volume of motor driven vehicles. The report covers this matter in detail, and careful study of the diagrams will reveal all the information contained therein. These charts and the report will be laid before the London



A Section of Regent Street, London, England, Indicating Character of Traffic and Method of Handling It.

addition of 436,492,548 more. The tramways and omnibuses can account for 1,349,109,979. This information takes into consideration only passenger carrying vehicles of a quasi-public character, and shows that practically 66 per cent. of such traffic is by road. Of course, it is impossible to secure information regarding the number of journeys made by private vehicles or those made by freight wagons and trucks.

The number of passenger journeys made by road within metropolitan London has almost doubled within the last decade, and the increase in population and the growth of trade have brought, at least, a corresponding increase in the use of the streets by postoffice and railway vans, and by the express and freight handlers generally. In spite of all this additional traffic, however, the road system, with the exception of

city councils, together with other information respecting congestion centres, etc., in an effort to still further solve the problem of diverting the large volume of traffic through the streets with safety both to passengers and pedestrians.

POSTAL WAGONS IN GERMANY.

Four Cities Now Using Motor Equipment, Largely of the Electric Type.

In a recent issue particular attention was drawn to the electric vehicles utilized by the postoffice at Vienna, Austria. The German government also has a number of motor vehicles, largely supplied under contract, the principal cities in which they are operated being Berlin, Munich, Leipzig and Hamburg.

Berlin has a fleet of 73 machines, 19 of which are electrically propelled three-wheel vehicles with capacity of about 500 pounds. These are utilized in collecting mail from the street boxes and for carrying mail between the main office and the sub-stations. The next division comprises 13 three-wheel wagons of about 900 pounds capacity, which are used for parcel post delivery. Then come 35 four-wheel electric wagons of 3700 pounds capacity, used for transporting mail in bulk between the railway stations and the several offices. And lastly, there are six 20 horsepower, one-ton gasoline wagons for long distance work.

In Munich the machines are owned by the state and are housed in a garage in the suburbs. The fleet comprises 12 of the smaller three-wheel electric vehicles and 49 gasoline vehicles rated at 20 and 30 horsepower. The former are used as collection wagons and the latter for parcel post matter.

Leipzig has 26 electric vans of 3500 pounds capacity, supplied by a contractor, and these are used mostly for the transportation of parcel post matter, and mail in bulk. Hamburg has but one gasoline machine rated at 12 horsepower, and with carrying capacity of about 450 pounds. This is an experimental machine, utilized for making box collections. The postoffice officials at Hamburg experimented with electrics in 1908, but they were abandoned, it is claimed, because local conditions among which were the gradients, were held to be unfavorable.

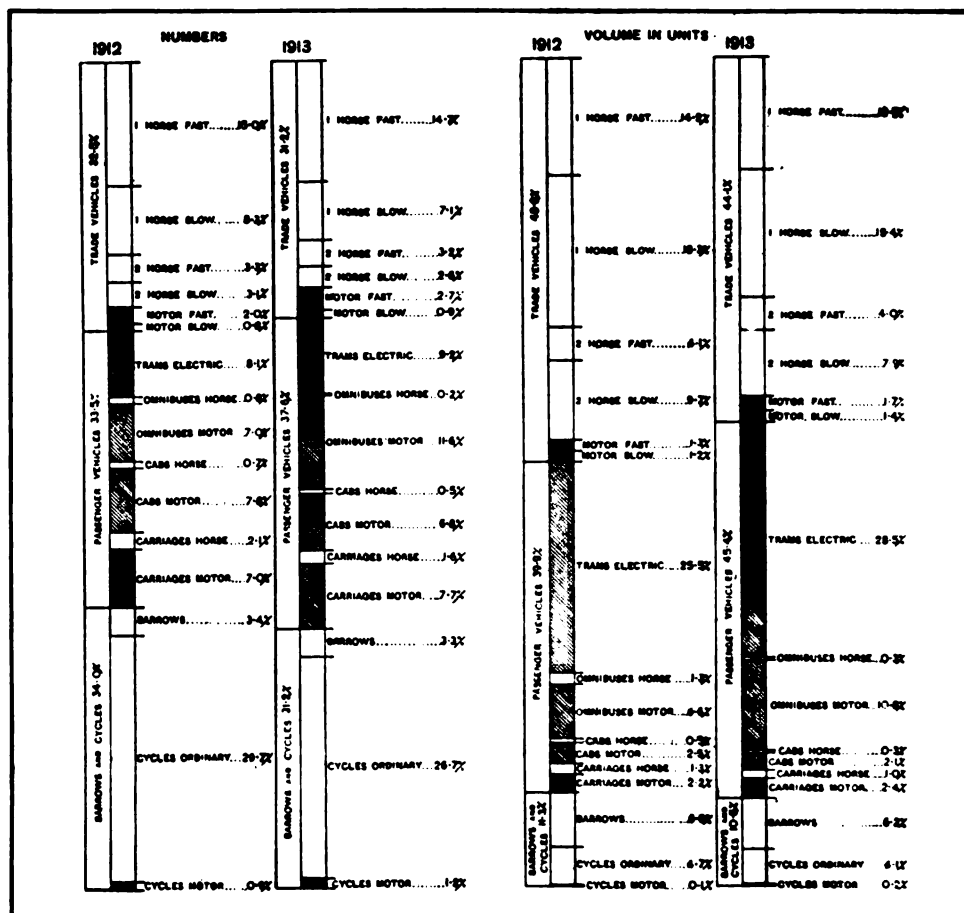
TRUCKS AT BRUSSELS SHOW.

Two Belgium Concerns Make Display, One Presenting Knight Engined Model.

A special section of the annual automobile show in Brussels, Belgium, Jan. 10-17, was devoted to commercial vehicles, this being the first time in the history of that event in which such prominence has been given to this line. King Albert visited the display and spent some little time among the motor trucks and business wagons.

The business men in Belgium have been giving unusual attention to motor driven equipment during the past year. One or two makers displayed trucks at the 1913 exhibition, but these were not segregated, and little attempt was made to call special attention to them.

The truck exhibits this year were largely confined to machines made in Great Britain, Germany and France, but two Belgium makers were represented. One of these was the maker of the Minerva, which presented a 2.5-ton truck, fitted with a four-cylinder Knight motor of 85 mm bore and 140 mm stroke (3.3 by 5.5 inches), located in the cab. The transmission affords four forward speeds and reverse and the final drive is by shaft to a worm driven rear axle, of the overhead worm type. The Pipe concern also revealed a new 3.5-ton chassis of conventional design.



Results of 1912 and 1913 Census Presented Diagrammatically to Show Relative Increase in Various Types of Vehicles.

DAIMLER-KNIGHT TRUCKS.

Original Producer of Machines Utilizing This Engine Adds New Models.

So much interest has been created in the Knight type of sliding sleeve valve engine, because of the recent remarkable test of a Moline-Knight motor in the laboratory of the Automobile Club of America, New York City, that attention may be directed to the latest Daimler truck chassis. So far as is known, the Daimler Company, Coventry, England, was the first concern to produce a Knight engined commercial vehicle. This was about a year ago, the chassis being rated at one ton.

It was anticipated that this concern would be confronted with a certain amount of prejudice against the use of this type of power plant, but the success which it had attained with Knight engined pleasure vehicles was such as to indicate similar results in the new

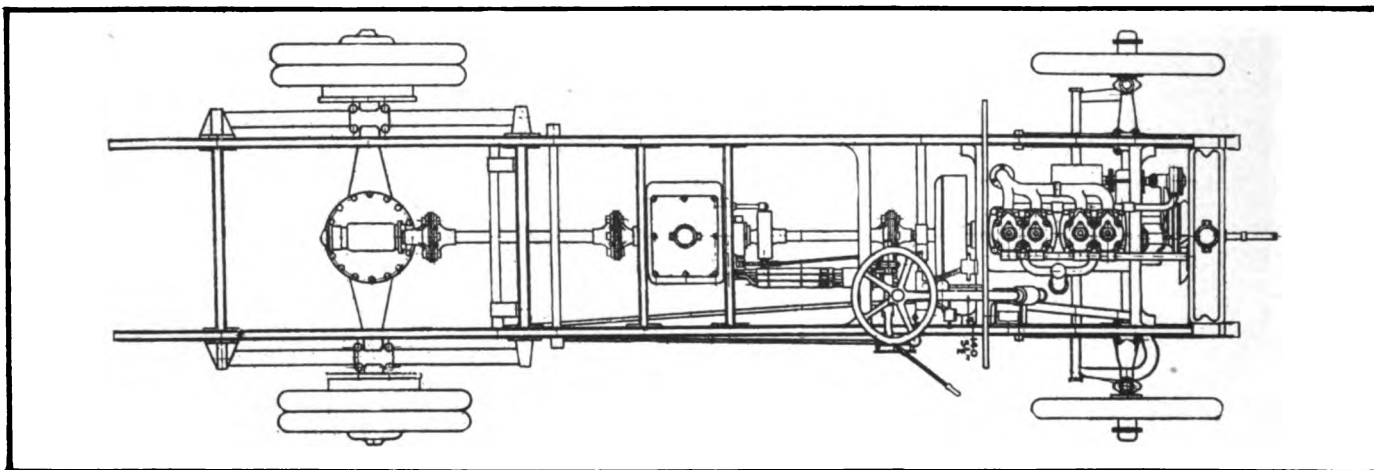
which is the same as that of the S. A. E. in this country.

Both machines are fitted with large diameter cone clutches, and the selective sliding gear transmissions afford four speeds forward and reverse. Final drive is by shaft, fitted with leather disc universal joints, to a worm driven rear axle. Another feature of the new chassis is the use of what is termed in Great Britain, flitch framing, in which both the side and cross frame members are of wood encased in steel.

GENERAL NEWS FROM ABROAD.

Rice Transport in India—Announcement is made that the proprietors of several rice mills in India have been making inquiries with regard to the use of mechanically propelled vehicles for hauling rice long distances.

Tunis Agricultural Trials—The officials of the Tunis government have arranged for a trial of agricul-



Two-Ton Daimler Truck Chassis, Equipped with Four-Cylinder Knight Engine and Worm Driven Rear Axle.

field. In this respect it is said to have been demonstrated to the entire satisfaction of the officials during the past year that the Daimler-Knight motor was well adapted to this work. A number of Daimler omnibuses, thus equipped, have been operating in London and in other important centres in that country and abroad, and several wagons have been working on all kinds of roads and in the hands of skilled and unskilled drivers. Other concerns are now engaged in the production of trucks fitted with sliding sleeve valve motors, notably Argylls, Ltd., of Alexandria, Scotland, which utilizes the Argyll single-sleeve type.

For this year the Daimler Company has added two Knight engined chassis, one being rated at two tons and the other at five. In essential characteristics they are very much alike, except, of course, for the difference in dimensions to provide for differing carrying capacities. Both motors are of the four-cylinder type, the larger having bore of 110 mm and stroke of 150 (4.3 by 5.9 inches), and the smaller, 95 by 125 mm (3.7 by 4.7 inches). The former is rated at 30 horsepower, and the latter at 22.4, under the R. A. C. formula.

tural motors April 15-22. For the first time classes will be provided for implements propelled by electricity, the other classes being for gasoline, benzol and steam. Makers may enter any number of machines, but only one of each type, by addressing the Direction Generale de l'Agriculture, 76, boulevard Bab Benst, Tunis, North Africa.

Motor Plows and Tsetse Flies—According to the Usambara Post of Zanzibar, the cotton growers in the Kilimanjaro district of German East Africa are convinced that they must abandon the enterprise unless they are able to secure motor plows. The tsetse fly prevails in many parts of the country and interferes sadly with the use of animals.

Passenger Service in Tasmania—Reports from Hobart, Tasmania, indicate that a splendid real estate boom has followed the introduction of motor omnibuses on the Bellville-Richmond route. Several people have purchased homes in that district, depending upon the motor vehicles for transportation.

THE A B C OF MOTOR TRUCK IGNITION.

Part XVIII--Explaining the Construction and Operation of the Type N B Pittsfield Magneto, a True High-Tension Instrument Employing a Stationary Winding and Operating on a Distinctive Principle.

By C. P. Shattuck.

IN PREVIOUS installments the inductor type of magnetos was discussed, two forms being described and illustrated, namely the K-W and Remy instruments. These differed in that one was productive of a true high-tension current, while the other generated a low-tension. The K-W comprises two stationary windings, one of coarse wire (primary) and the other of fine (secondary), these being mounted between two halves of a rotor which revolved, but the windings remained stationary. The principle employed in the Remy

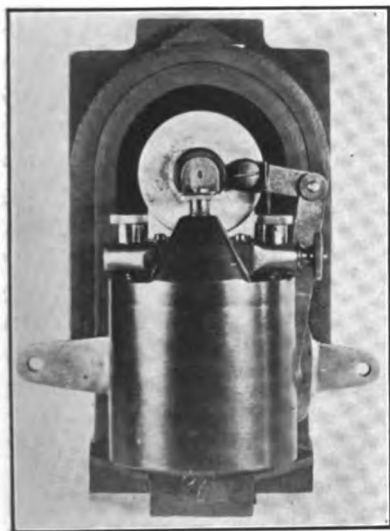


Fig. 103—Rear View of Pittsfield N B Magneto.

was similar (the Remy Electric Company has abandoned the inductor type), but the electricity obtained by the rotation of the inductors was low-tension. With the types mentioned it will be remembered that the winding, or windings, was mounted on the armature shaft of the instruments.

How Pittsfield Differs.

The type N B Pittsfield magneto differs materially from the types above mentioned, although the induction method is employed. By referring to Fig. 106, a longitudinal sectional view of the magneto, it will be noted that while the usual primary and secondary windings are utilized they are not incorporated with the armature, but are at the rear of the instrument, and are stationary.

The view at the right is a lateral cross section of the magneto and it will be seen that the field has four pole pieces instead of the conventional two. Two of the pole pieces are attached to the permanent magnets in the usual manner. The others with the iron core of the transformer coil (the primary and secondary windings) comprise the magnetic field in which the armature or inductor rotates on ball bearings.

Alternating Current.

The rotation of the inductor in the magnetic field serves to reverse the flow of magnetism alternately from the pole pieces to the magnets forming a magnetic circuit with the transformer coil core. This al-

ternating current, during each revolution of the armature, attains a maximum four times, and with each 90-degree rotation of the armature a spark is obtained. With the type N B Pittsfield only two sparks are utilized.

Primary Winding.

One end of the primary winding of the transformer coil is connected to a contact button which is at the left of the horizontal bar above the circuit breaker mechanism and is depicted at Fig. 105, this being a rear view of the N B instrument. The other end of the primary is attached to a contact plate incorporated in the horizontal bar referred to, which is screwed onto the field, and insulated from it by a hard rubber plate and bushings. A brass plate forms a connection for the passage of the primary current to the platinum contact piece and contact screw. This plate is shown in the illustration detached from the platinum contact screw retaining mechanism, as the circuit breaker cover has been displaced. This plate, or lever as it may be termed, moves with the circuit breaker housing.

Interruption of Primary Circuit.

The contact piece is insulated from the interrupter plate, which is in metallic connection with the field or ground. The platinum contact points are normally held together by means of a spring. The lever is in metallic connection with the field, and the current generated in the primary winding is short circuited as

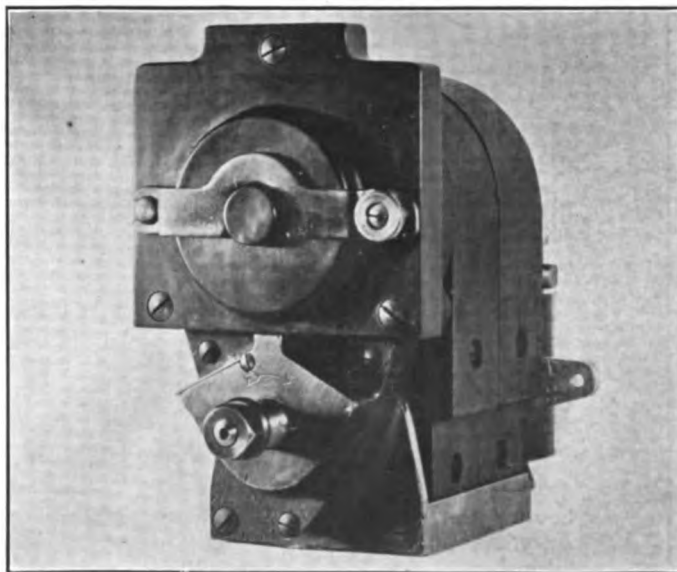


Fig. 104—Pittsfield Type N B Magneto, a True High-Tension Instrument Employing Distinctive Inductor Principle.

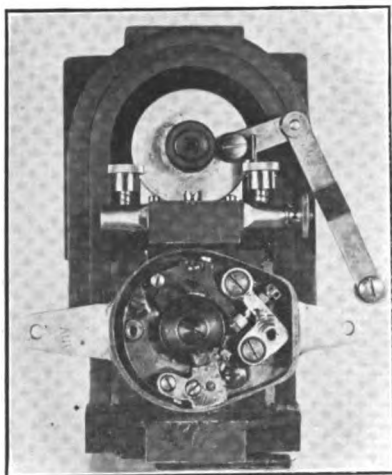


Fig. 105—Interrupter of Pittsfield Type N B Magneto.

long as the platinum points are together, but is interrupted upon the points separating, which is accomplished by the interrupter cam coming in contact with the lever. The cam is a two-point member, separating the points twice each complete revolution of the armature shaft to which it is secured and with which it revolves.

The other components of the circuit breaker mechanism are stationary; that is, do not rotate with the armature shaft, but are moved a certain number of degrees to obtain an earlier or later break of the points, or advance and retard of the spark. The housing is provided with two levers for connection to the linkage to facilitate installation of the instrument.

Secondary Circuit.

The beginning of the secondary winding is connected to one end of the primary. The other end of the secondary is attached to a terminal to which is secured a metal plate or bridge in connection with which is the safety spark gap. The high-tension current is conducted from this bridge to the distributing brush by two conductors which are insulated from the metal parts of the instrument. Connections between these conductors is by a carbon brush having a spring.

Distribution of Current.

The distributor plate is of conventional design and with the N B instrument is provided with four segments, these being connected in turn by cable to the spark plugs of the cylinders of the motor. The dis-

tributor brush is of the wipe contact design, and the distributor gear is in mesh with a half-time gear on the armature shaft and rotates in an opposite direction.

The magneto is driven at crankshaft speed with four-cycle, four-cylinder motors, and, as is the case with true high-tension instruments, the primary current is diverted from the secondary windings when it is desired to stop the operation of the motor. Referring again to Fig. 105, it will be noted that the horizontal bar above the circuit breaker carries a terminal. This is wired to the switch, thence to ground. Closing the line short circuits the instrument.

Timing Feature.

It is stated by the maker that the magneto permits of a variation of 45 degrees in timing with a four-cylinder, four-cycle engine, and that the retarded spark is just as efficient as when the lever is advanced. It is also claimed that the engine may be started on a quarter-turn of the crank with the spark lever fully retarded.

The interrupter mechanism is located between the coil and the bearing plate of the inductor and is easily removable by displacing the transformer. The opening of the contact points should be .015625 inch when fully separated, and adjustment is made by loosening a locking nut and turning the movable screw, designated as platinum screw in the drawing at Fig. 106, which shows the components of the instrument.

Timing the Magneto.

The instrument is timed by placing the first cylinder on dead centre or at the completion of the compression stroke. The distributor cap is then removed by pulling outward on a knurled knob and lifting a brass yoke. These parts are shown at Fig. 104, which depicts a front view of the N B instrument, which is also the driving end. The armature shaft is then rotated until the centre of the brush holder of the distributor arm is directly under the line marked on the distributor plate of the lower right hand segment

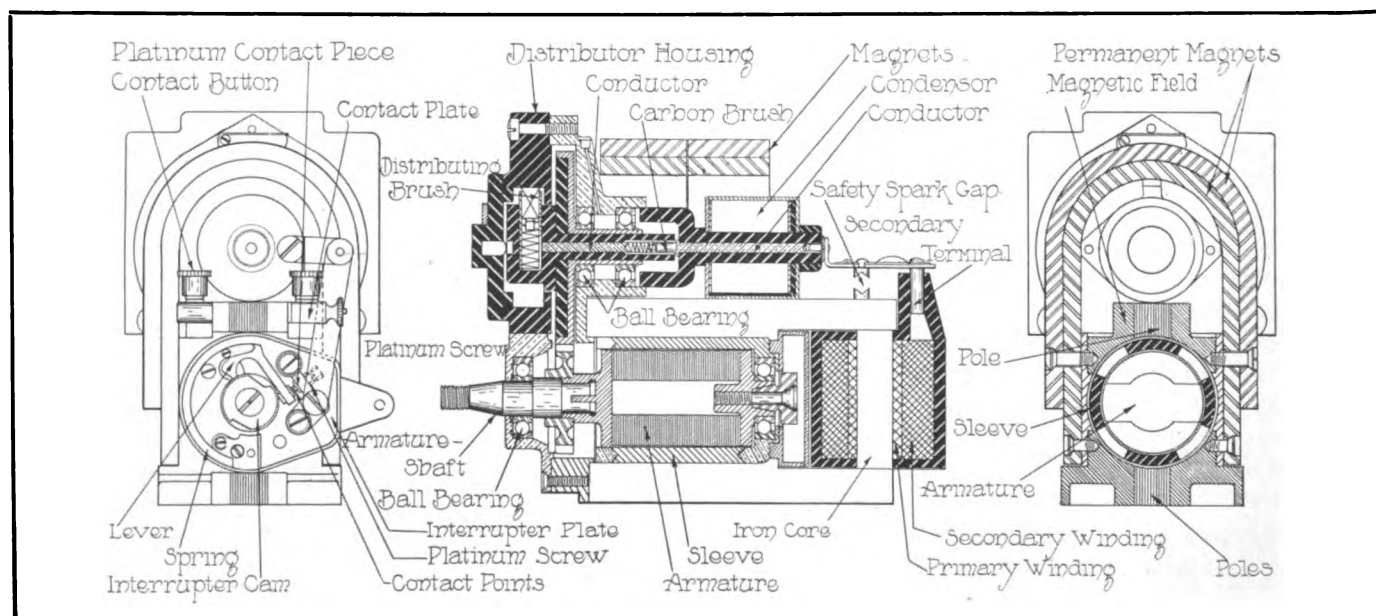


Fig. 106—Pittsfield Type N B Magneto: At Left, Interrupter Mechanism; Centre, Longitudinal Sectional View with Components Lettered; at Right, Lateral Cross Section Showing Four Pole Shoes.

when facing the driving end of the magneto. The cables to the plugs are connected according to the firing order of the cylinders.

Varying Time of Spark.

The Pittsfield provides variable ignition; that is, the break of the contact points and time of spark may be altered by changing the position of the field poles by means of the sleeve, which is provided with a lever with which the sleeve and the interrupter can be retarded or advanced. The sleeve referred to consists of four pole pieces of magnetic material mounted between ends of non-magnetic metal, and, when oscillated, serves to distort the magnetic flux, and at the same time, causes the contact points to separate sooner or later in relation to the engine piston travel and thus vary the time of sparking in the cylinder.

Pittsfield Dual System.

While the N B type of instrument may be employed for single ignition it can also be utilized as a dual, either with the same set of plugs, or with a separate battery timer and coil with a distinct set of plugs,

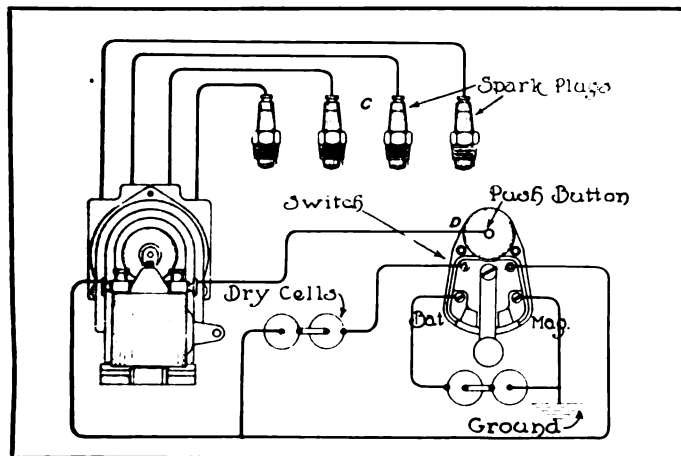


Fig. 107—Wiring Plan of Pittsfield Dual System, Including Push Button Type of Switch for Starting from the Seat.

for starting or for regular use. These features are obtained by the use of a separate transformer, whereas the conventional type of true high-tension magnetos employs two windings on the armature, the latter forming a part of the magnetic circuit of the permanent magnets. One end of the primary is usually grounded inside of the armature and the other end is brought out and connected to the interrupter.

In the Pittsfield dual system magneto both the primary and secondary windings are located in a housing at the rear of the instrument. One end of the primary is connected to the interrupter and the other to a three-point switch, so that when the lever is on the magneto side, the magneto operates as a true high-tension instrument. When the switch lever is moved to the battery position, the primary lead is connected to the proper pole of the battery, and the current from the cells is connected in series with the generated current, assisting it or building it up when the engine is operating at slow speeds.

As the resistance of the magneto coil is very small, not more than two dry cells must be employed in a circuit, and according to the wiring diagram

shown at Fig. 107. The various parts should be easily distinguished. In starting with the type of switch shown in the drawing the lever is placed on the battery side and the push button tapped quickly.

The Pittsfield engine starting device is shown at Fig. 108 and was designed especially for service with the Pittsfield instruments for starting the motor from the seat. It is located on the dash and requires but three low-tension wires, these running from the starter to the magneto and engine connections. By placing the key in the proper position and pressing the small button shown in the centre of the face plate, a vibrating current is passed through the starter, resulting in a shower of sparks in the cylinder.

Care and Lubrication.

The ball bearings of the magneto require a few drops of oil monthly, depending upon service, and the places are marked "oil". The gaps of the spark plugs should be between .015625 and .01325 inch. To adjust the interrupter the coil is removed by unscrewing the connecting studs on its top. The type N B Pittsfield is constructed to be driven both clockwise and anti-clockwise, but is not reversible.

The type N A magneto is designed for two-cycle motors, and for a four-cylinder engine is driven at crankshaft speed. It can also be utilized on a four-cycle motor by driving it at camshaft speed. It differs from the type N B in that a four-point cam is employed instead of a two, a different ratio of gearing being utilized, and a jump spark type of distributor is used instead of the regular brush design. The type F shown at Fig. 109 is used on motors of low compression and which require no timing. It is similar to the type N B with the exception that it requires no sleeve for shifting the magnetic poles when advancing and retarding the spark. The interrupter is fastened to the end of the field and is in a fixed position. A jump spark distributor is utilized and is driven at the same ratio as the type N B. The N C magneto is designed for six-cylinder motors.



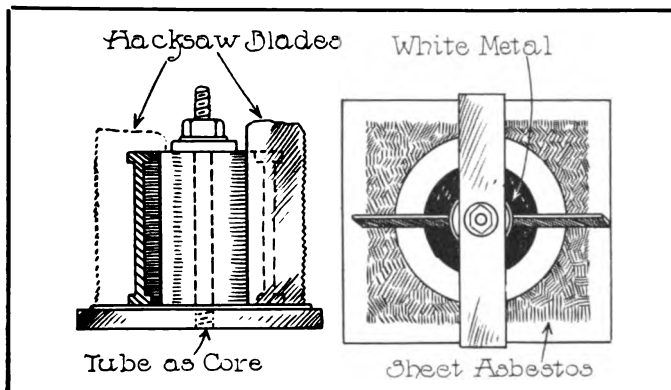
Fig. 108—Pittsfield Engine Starter.



Fig. 109—Type N F Pittsfield Magneto.

HINTS FOR PROPER MAINTENANCE.

IN REBABBITTING bearings it is essential that the surfaces be clean in order that the anti-friction metal will adhere to the caps. With a good grade of



Easily Constructed Mold for Pouring Bearings, a Tube and Hacksaw Blades Forming the Core.

babbitt and a practical apparatus for holding the bearings to be remetalled, the work may be accomplished satisfactorily. The following method is suggested by a repairman who states that the mold for pouring is constructed easily. The apparatus is shown in an accompanying illustration, and it will be noted that a tube and portions of hacksaw blades are used for the core. The most essential feature is the use of a .375-inch diameter Whitworth hole. This should be tapped through the centre of a small face plate to accommodate a clamping bolt.

A piece of asbestos, the overall size of which should be larger than the two halves of the bearing caps when placed together, is utilized, and a hole drilled in its centre, slightly larger than that of the plate. The core is provided by iron piping of the various diameters and according to the size of bearings to be rebabbitted. The retaining bolt for the bearings is made from a piece of rectangular mild steel, having a .375-inch hole drilled through, and this placed across the top edge of the bearings serves as a clamp. Before tightening the brasses down, two pieces of hacksaw blades are placed between the two halves, so as to separate the metal during the pouring.

Previous to placing the tube in position it should be well coated with lamp black to prevent the metal sticking. The caps should be heated previous to the pouring and should be clean. It is stated that the work results in a casting free from flaws.

REMAGNETIZING MAGNETS.

The remagnetizing of magneto magnets is generally left to the maker of the instrument, and that is, perhaps, the best plan, as the manufacturer has special equipment for the work. However, a method of remagnetizing is given in the Commercial Motor, and the repairman contributing the suggestion was awarded first prize by that publication. The apparatus and wiring diagram are shown in an accompanying illus-

tration, and it will be noted that two storage batteries are utilized, also two bulbs.

To make the apparatus two pieces of soft iron are employed, about six inches long and about 1.25 inches in diameter. These are used for the cores. The base is constructed of a piece of mild steel plate in which are tapped two .5-inch holes and these are threaded to take one end of the iron core.

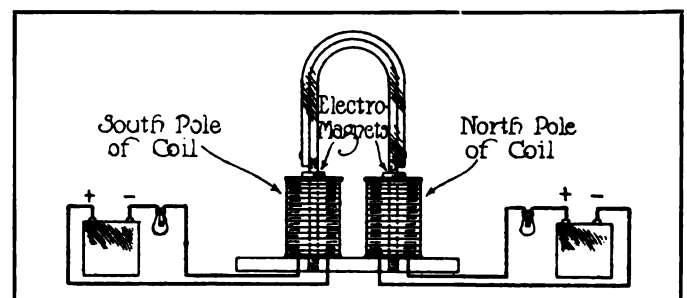
Before screwing the core pieces in position, they are wound with an equal number of turns of No. 22 gauge insulated copper wire, the ends being left free. To these are attached four terminals. The wires are connected up to a pair of storage batteries as shown, and the latter are so wired that the polarity of the soft iron cores, indicated by the compass needle, is north and south respectively.

The inventor of the apparatus states that should the coils show signs of overheating, one or more lamps should be placed in each circuit to introduce resistance. Before beginning the work it is essential to ascertain the polarity, and this is accomplished by the aid of a compass needle. The magneto magnets must next be marked north and south, respectively, before there is any opportunity of reversing the process by confusing the poles.

To use the apparatus it is stated that it is only necessary to place the magnets with their opposite poles in contact with the cores, until they have absorbed sufficient magnetism to enable them to sustain a weight of 10 pounds, after which they are ready to be replaced on the magneto. In the drawing the magnet to be treated is the inner member.

STARTING SEIZED PISTONS.

The following suggestion is made for starting seized pistons: Place about a pint of kerosene in each cylinder, then jack up one of the front wheels so that it clears the ground by at least two inches. Next place a jack under the starting handle with the clutch section engaging with the crankshaft. Lower the jack until the handle carries the weight of the machine. It



Remagnetizing Magneto Magnets by Apparatus Designed by a Repairman.

is stated by the repairman suggesting the plan that by this method the most obstinate piston may be started.

STEWART AUTOMATIC CARBURETOR ADJUSTER.

THE Stewart-Warner Speedometer Corporation, Chicago, is introducing a thermo-automatic carburetor adjuster which is designed to automatically

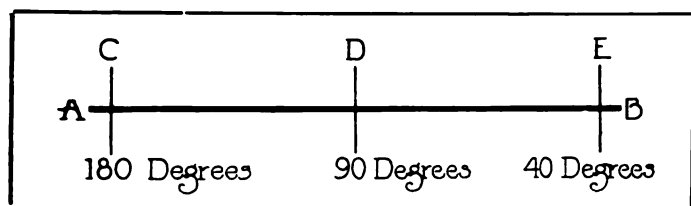


Fig. 1—Chart Showing Various Carburetor Adjustments, That at E Indicating Where It is Stated the Stewart Provides the Richest Mixture Possible.

regulate the operation of the carburetor by temperature. The device is so constructed that it may be utilized with varying makes of carburetors and to regulate the amount of air admitted or the fuel supply. This is performed automatically, the augmenting or decreasing of the air and fuel being performed by a novel application of the use of mercury, a metal which responds readily and accurately to changes in temperature. In the Stewart device the expansion and contraction of mercury adjust the carburetor.

It is well known that a rich mixture makes for easy starting of a cold motor, and that the average driver adjusts the carburetor so as to enrich the mixture at low motor speeds. At higher ratios, and when the cylinders have attained an operating temperature of, say, from 170 to 180 degrees Fahrenheit, the flow of fuel or its emergence from the jet is considerably faster than at starting. Prof. Brewer, an English authority on carburetion, holds that there is a difference of 39 per cent. from the same sized opening in a change of 15 degrees.

A rich mixture for starting has its advantages, but as previously pointed out, upon the engine becoming warm, there is apt to be too great a supply of fuel in proportion to the air at high speeds. This makes for waste of fuel, to say nothing of creating sooty deposits on the cylinder walls, valves, etc. While the modern carburetor manufacturer makes provision for

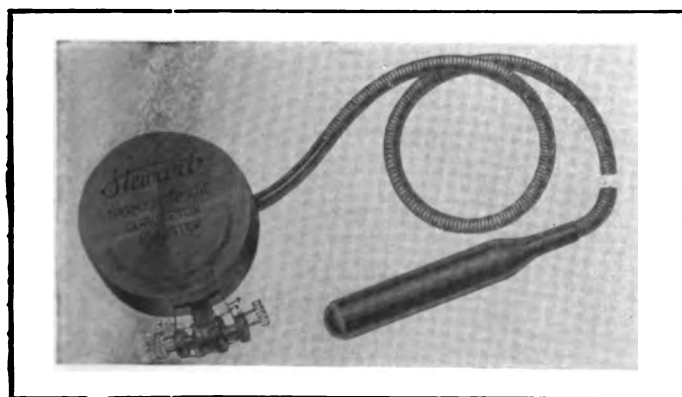


Fig. 2—Stewart Thermo-Adjuster, Which Automatically Regulates the Air or Fuel by a Novel Use of Mercury.

enriching the mixture for starting, providing dash or steering column adjustment of the air, the judgment employed by the driver is not always the best.

The inventor of the Stewart thermo-automatic adjuster states that it increases the density of the mixture for starting when the cylinders are cold; automatically proportions the fuel or air in accordance with the temperature of the combustion, preventing waste of fuel, and obtains a perfect mixture throughout the entire range of adjustment on any carburetor.

The Stewart thermo-automatic carburetor adjuster is composed of a metal bulb, connection tubing and a Bardon coil enclosed in a metal box, from which protrudes a plunger or pushrod as shown at Fig. 2. The bulb is tapped into the water circulation system, in the outlet water manifold, for example, as shown at Fig. 3, and the adjuster proper is attached to the carburetor in such manner as to permit the pushrod or plunger to actuate the air valve or needle valve of the carburetor. The movements of this rod are indicated by the dotted lines at Fig. 2.

The temperature of the fluid in which the bulb is immersed causes the mercury to contract or expand,

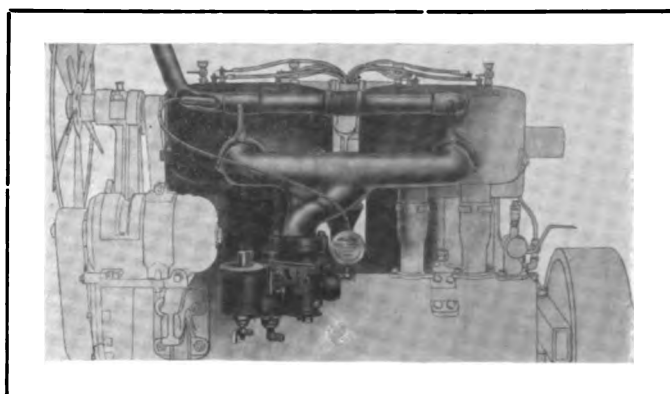


Fig. 3—Showing the Stewart Device Installed on a Rayfield Carburetor—The Bulb Is Located in the Outlet Water Manifold.

as the case may be, and the pushrod is actuated accordingly. It is claimed by the inventor that the thermostat will operate within one degree of the indicated temperature, and that the maximum valve movement is .3125 inch.

With the Stewart, the carburetor is adjusted as nearly correct as possible, but the adjustment of the device is so made as to have no effect except when the temperature of the water jacket falls below 180 degrees Fahrenheit. At this point, and to 40 degrees, it is held that the Stewart will automatically regulate the mixture.

The chart at Fig. 1 brings out the points emphasized in the Stewart device. AB represents the entire range of adjustment on any carburetor, A being the point where back firing occurs. C indicates the 180-degree point, held to be the most efficient and economical. D is the 90-degree point, where it is claimed that the majority of carburetors are adjusted so as to obtain easy starting. E is the 40-degree point, where it is stated the Stewart device provides the richest mixture possible.

The intersecting line C denotes the ideal adjustment, where the most economical and most efficient proportions of fuel and air are obtained when the motor is operating under perfect conditions and the temperature of the water is 180 degrees. With the lowering of the temperature the conditions represented by A will be experienced. With the adjustment as indicated by D the easy starting is offset by too rich a mixture, upon the cylinders attaining their working temperature. E indicates the 40-degree point, where it is pointed out that the Stewart device provides a rich mixture; that is, under conditions requiring more fuel or less air, as in starting in low temperatures.

With the Rayfield carburetor, as shown at Fig. 3, the Stewart operates on the air valve, a loose sliding collar being employed. At low temperatures the push-rod increases the tension of the spring controlling the air valve, decreasing the supply of air and enriching the mixture to meet conditions. Under ideal operating conditions the Stewart is inactive. Changes in temperature, however, are automatically compensated for as previously explained.

The Stewart thermo-automatic adjuster is designed for service with all types of carburetors and eliminates changing the proportions of fuel and air. It is the intention of the company to manufacture the Stewart adjuster for application to the exterior of the circulating system, eliminating the tapping of the water pipes or manifolds.

SCHOOL FOR GARFORD DRIVERS.

With keen realization of the advantages obtaining from the services of experienced well trained men driving vehicles, the Overland-Garford Sales Company, Cleveland, O., has established a school in that city for the benefit of men who are now engaged as drivers or desire to have employment as such. The company is agent for Garford trucks and Willys Utility and Overland wagons, and having demand for the services of capable drivers, familiar with the machines named, which it was not always able to supply, for the protection of its own and its customers' interests the company organized a school.

The school has been well attended and can be considered as a success from every point of view. The course covers a period of six weeks and during that time each student receives 12 lessons and three competent men instruct the classes, following theory by practical work on machines of the types stated.

"SAFETY FIRST" EDUCATION.

The people of Indianapolis, Ind., are now experiencing a "safety first" campaign, which was inaugurated by the Hoosier Motor Club of that city, and which will be continued as long as may be necessary to minimize accidents in the streets. The club is distributing to the school children printed advice of how to avoid danger in the streets, and a series of advertisements

will be printed which will ask all persons, especially drivers of vehicles of any kind, to observe traffic and other regulations. The police will also be instructed, if the desires of the club are observed by the mayor, to strictly enforce all laws regarding street traffic, the purpose being to make the streets as safe as is practical for both vehicle users and pedestrians.

MAY TAX MOTOR TRUCK SALESMEN.

A bill is now pending in the Kentucky legislature that contains a provision that all salesmen for automobile vehicles in counties containing cities of the first and second classes shall pay annual license fees of \$100, in counties containing cities of the third and fourth classes license fees of \$50, and in all other counties license fees of \$30 each, and that the revenue shall be made a fund for the improvement of the highways, each county to receive the amount of the license fees collected within that county from the fund. It is needless to state that the bill is being very vigorously opposed by those who are in any way interested in motor vehicle distribution.

CONNECTICUT INCREASES FEES.

Under an opinion of Attorney General John I. Light of Connecticut, owners of passenger vehicles that have converted them to delivery use will be required to pay the registration tax for passenger cars, which is 50 cents a horsepower. This will mean a considerable increase in the fees to be paid. Until now the machines have been registered in the commercial class on which the registration fee is \$7 for any vehicle of 1400 pounds capacity or less, and \$3 for each additional 1000 pounds. By this ruling a man who formerly paid \$7 for a converted 40 horsepower car will now have to contribute \$20 to satisfy the state authorities.

The Goodyear Tire & Rubber Company has appointed E. P. Dowse of Grand Rapids, Mich., manager of its Toledo, O., branch, vice M. M. Norton, who has been named district manager for the company, and F. H. Casebeer, manager at Oklahoma City, Okla., has been transferred to the managership of the St. Louis, Mo., branch, he being succeeded by F. J. Arling of the St. Louis branch.

The entire sale of Cleveland trucks is directed by C. D. Paxson, Cleveland, O., the machines being shipped by the maker, the Lewis Spring & Axle Company, Jackson, Mich., according to orders from the agents and representatives.

A factory at Tacoma, Wash., is projected by the Gramm-Bernstein Company, Lima, O., maker of B. A. Gramm's trucks, and if the plans are carried out this will probably be built the coming spring.

CORRESPONDENCE WITH THE READER.

Filtering Lubricants.

(56)—Some time ago you published an illustration showing a plan whereby old lubricant could be filtered and used over again. The story appeared in your magazine, but I fail to find it as one or two copies are missing. Would it be asking too much to republish the sketch of the filter?

OLD SUBSCRIBER.

Waterbury, Conn., Jan. 23.

The article referred to was published in the August, 1913, issue of the MOTOR TRUCK. The

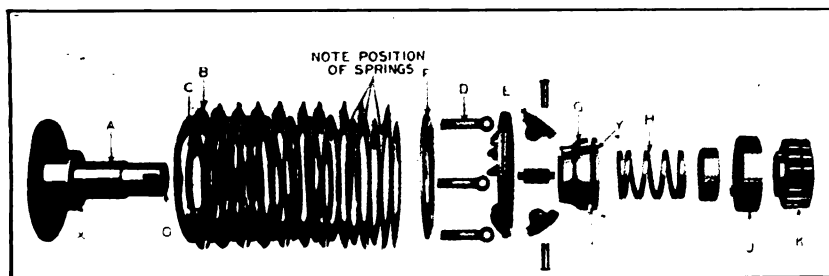


Fig. 1—Multiple Disc Clutch Disassembled to Make Clear the Operation of Parts and Method of Adjustment.

sketch of the filter is shown at Fig. 2, and consists of a round tank, a fine mesh brass screen, an extra vessel, two ordinary tin funnels, some metal tubing and a petcock. A five-gallon can is to be preferred. Remove its top and solder three projections to the walls as shown to support each funnel and the screen. Drill a hole in the lower side of the container and fit .25-inch copper tubing, which is led to an extra vessel. The installation of a petcock in the line is advisable, as it will permit of shutting off the dripping oil when the filter is to be cleaned. As the drawing is lettered it should be a simple matter to construct and operate the filter.

Multiple Disc Clutch.

(57)—The firm with which I am employed uses a K-R-I-T car which has a disc clutch. It is not working right, as it slips. What is the proper method of adjusting it, etc.?

DRIVER.

Kansas City, Mo., Jan. 17.

The clutch mentioned is composed of 10 large steel discs and 11 smaller plates, as shown at Fig. 1. While it would appear that the large discs are similar, four are left hand and six are right hand. The reason for this is obvious. By placing one disc on top of the other it will be noted that the small springs cut in the edge of the disc do not bear together, and that the 11 small discs C are interleaved between each of the 10 large plates. The latter fit onto three pins securely fastened to the flywheel and the small discs are secured to the clutch drum or body A, which revolves freely on the end of the crankshaft, and to which the gear K is fitted.

The discs are held in place on the drum by the three adjustable eye bolts D. To these are secured the toggles E E, one end of which bears against the disc plate F, the other end of the toggle bearing against the cone G, in the bore of which is located a strong spring H. The action of this spring against the cone, toggles, etc., is to keep the large and small

discs together. The clutch pedal is connected to the clutch by means of a shaft and two pawls which fit into a groove I, and when the pedal is pushed forward or depressed its motion pulls the cone G back, thereby releasing the pressure from the 11 small discs, permitting the flywheel to revolve the large plates without rotating the smaller ones and subsequently revolve the gear K. These parts are shown at Fig. 1.

To adjust the clutch the pedal is fully depressed, which will bring the cone G towards the bearing J. To hold the clutch out place a stick against the pedal or place some object between the cone G and the hub of clutch D at X. Remove the pin passing through the eyebolt D and make one turn to the right. Replace toggle pin and adjust the next toggle in the same manner; also the third.

The discs operate in oil and should the clutch slip it should be flushed with kerosene. Depress and release the clutch several times and crank the motor to allow the oil to work between the plates. Remove all kerosene and refill with fresh lubricant.

The business of S. F. Bowser & Co., Fort Wayne, Ind., manufacturer of gasoline storage equipment for garages, was stated by the general manager at the annual convention of the Pacemakers' Club, composed of salesmen for that concern, to have reached the \$4,000,000 mark last year, this being practically the same as for 1912. In other words, the business of the company showed no decrease.

G. O. Bristol, formerly connected with the Chicago branch, has been named manager of the commercial vehicle sale department of the Motz Tire & Rubber Company of Akron, O., and is now located in Akron.

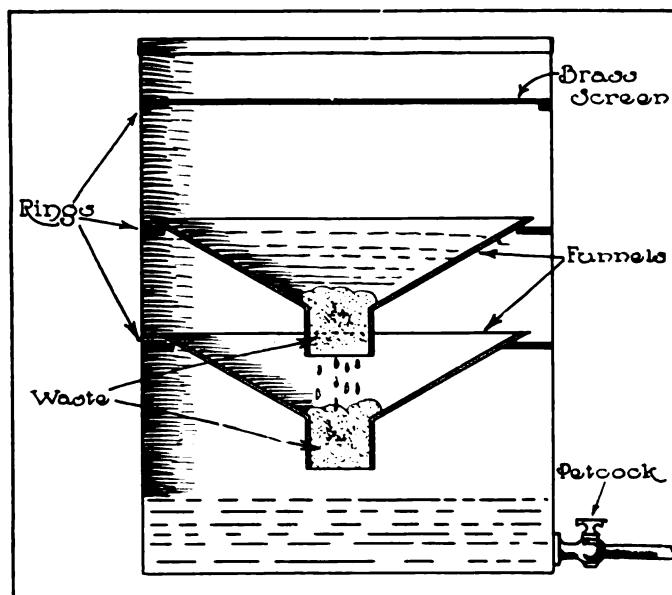
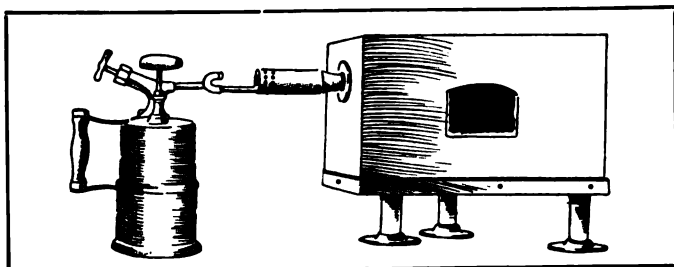


Fig. 2—Oil Filter for Renovating Old Lubricants.

GARAGE AND SERVICE STATION EQUIPMENT.

THE Hauck Manufacturing Company, 140 Livingston street, Brooklyn, N. Y., is marketing the Hauck patent kerosene torch, which is designed for



Hauck Kerosene Torch in Service with Furnace Made by the Same Concern.

general shop work and is held to be more efficient and economical than a gasoline unit. The maker states that the cost of operation is very low; that considerably more heat is obtained with kerosene than gasoline, and that the fuel is not only cheaper, but it is readily obtained. Another advantage in kerosene is held to be that it may be stored without restriction and is safer to use than gasoline.

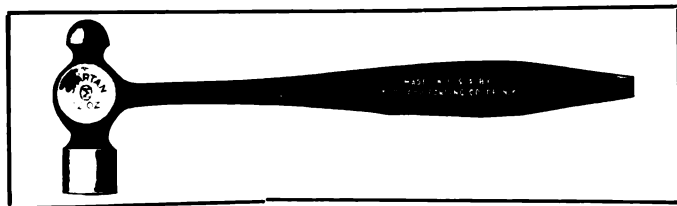
The company states that its No. 14 torch will melt a piece of copper .5 by .25 inch, in three minutes, or a one-inch brass rod in two minutes. It is utilized in conjunction with a heating furnace, as shown in the accompanying illustration, providing a combination especially adapted for tool dressing, tempering, annealing and other heating operations. The furnace is 10 inches long, 10 wide and six high; made of cast iron and lined with a high grade fire brick. The company states its torches have been adopted by the United States government.

ATLAS BALL GAUGE.

The Atlas Ball Company, Philadelphia, is placing on the market a new ball gauge which can be utilized as a limit gauge, the ball on one end being gauged to 1.251 inches, and the other 1.249 inches. Complete details are supplied by the company, which is located at 201 Glenwood avenue.

SPARTON HAMMER.

The Drop Forging Company, Jersey City, N. J., is manufacturing the Sparton hammer, shown in an accompanying illustration, and the maker calls attention to the design, stating that it is particularly adapt-



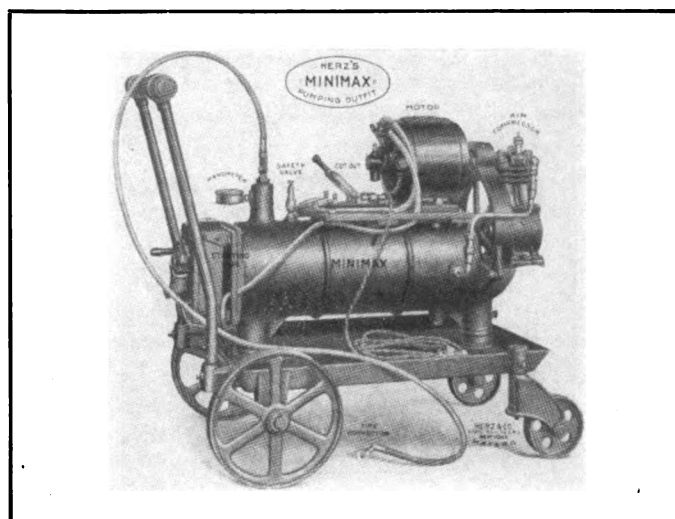
Sparton Hammer, Combining Screw Driver, Tire Iron, Etc.

ed to motor car work where a hammer, screw driver and tire iron are constantly required. It is also claimed that it has the essential qualities of a general utility tool.

MINIMAX PUMPING OUTFIT.

Herz & Co., New York City, is marketing a portable type of electric air compressor, termed the Minimax garage pumping outfit. It is a complete air compressor equipment mounted on a truck having a convenient handle for moving the unit as desired. A feature of the truck is the use of a metal tray which is sufficiently large to accommodate tools in addition to the motor, pump and tank.

The air compressor is a double-cylinder pump with cranks set at 180 degrees. The cylinders have a bore of 1.375 inches and stroke of 2.5, and the operating



Minimax Garage Pumping Outfit Marketed by Herz & Co.

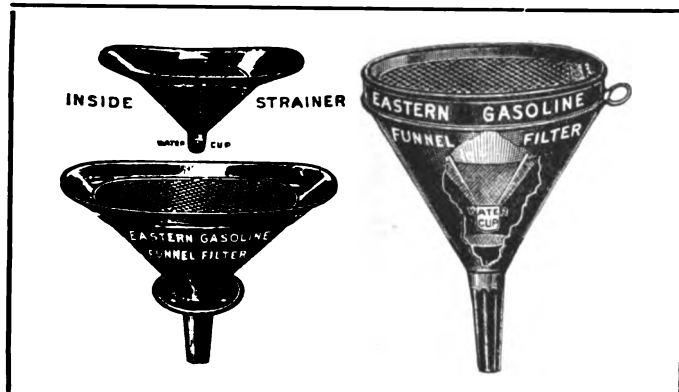
speed is 400 revolutions a minute. The height is 11 inches, width 3.5. The electric motor is rated at .25 horsepower, and is supplied for direct or alternating current and different voltages. The gears driving the pump are accurately cut, of high grade material, and are enclosed by a guard.

The tank is of cast iron, and all air passing to it flows through a check valve of special design. The tank is 20 inches long and nine inside diameter. The capacity of the tank is equivalent to 5.5 gallons of water. It is tested to a safety pressure of 250 pounds. A safety valve is placed behind the manometer and may be set to a pressure up to 125 pounds, and the valve is stated to be very accurate in its action and will not require attention.

One of the qualities of the equipment is that all wires between the motor and the switch are carefully protected against damage or leakage of current. Connection to the supply of electricity is by a cord and a lamp socket. The equipment includes a starting switch and suitable length of steel covered hose.

EASTERN GASOLINE FUNNEL FILTER.

The Eastern Oil Tank Company, 146 Fletcher street, Lowell, Mass., is manufacturing the Eastern gasoline funnel filter, a part sectional view of which is



Eastern Gasoline Funnel Filter for Separating Water and Other Foreign Elements from the Fuel.

shown herewith, also the construction of the inside strainer. The maker states that the design is very efficient in separating water and other foreign elements from the fuel and that the construction permits of easy disassembly and replacement.

As will be noted by the illustration the gasoline is filtered through a mesh and an inside strainer is included, the latter catching all water. The maker states that the funnel can be used in rainy weather without any water reaching the tank and that splashing of fuel is prevented. The funnel filter is made to be carried easily in the car, assuring the use of clean fuel when purchased on the road, etc.

STARR OVAL CUTTER.

Cutting circular gaskets, etc., is a simple matter compared to oval members, and generally considerable time is required with the latter in order to obtain perfect work. The Shawver Company, Springfield, O., is marketing a practical device, for cutting ovals, termed the Starr-Springfield cutter, which is shown herewith. The No. 1 tool will cut any size circle up to 15 inches, and ovals up to 15 by 22 inches. The No. 2 cuts circles up to 22 inches and ovals to 22 by 34 inches.

The bars are graduated by inches and fractions of fourths, permitting the operator to set the machine instantly to cut the size of opening previously determined. The machine is equipped with an automatic stop, limiting the downward movement of the knife, making it impossible to cut into the table top. The four corners have adjustments for raising or lowering, so that the machine may be levelled to conform to the table surface.

A quick acting clamp is provided for holding any thickness mat board up to .25 inch, and is quickly adjusted to any size opening. When the machine is not

at work the clamp and its components rise from the table, a feature the maker states is not found in any other oval cutter. The complete equipment includes a cutting board, one wheel glass cutter, one embossing wheel, one knife for cutting 23-degree bevel edge, one knife for cutting a square edge, one stub knife for cutting long, narrow ovals, and a wrench.

VULCAN CHAIN PIPE VISE.

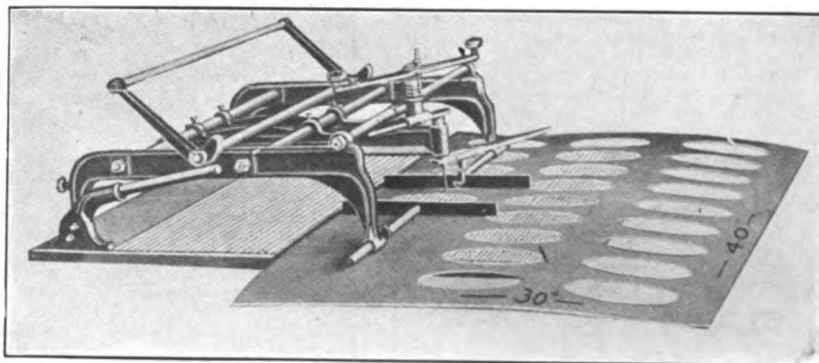
J. H. Williams & Co., 150 Hamilton avenue, Brooklyn, N. Y., is manufacturing the Vulcan chain pipe vise, which is constructed of bright steel throughout and is claimed to be unbreakable. It is also compact in design and may be set up readily for service. It has drop forged steel jaws, tempered for file sharpening. The vise is made in three sizes with pipe capacities of from .125 to eight inches.

ERICKSON HOSE CLAMP.

P. E. Erickson & Son, Port Chester, N. Y., is manufacturing a new type of hose clamp. On end of the band intersects the other and this with a screw adjustment permits of use with different diameter hose. The standard finish is electro-galvanized, but other finishes are provided. The sizes range from .375 to two inches.

WANTS SUBSTITUTE FOR RUBBER.

A prize equal to \$10,000 has been offered by the minister of war of Austria for a material or a device that will be the equal of rubber when utilized as a motor truck tire or incorporated with the wheels of machines. The conditions are that the material shall have elasticity and requisite adhesion and be more enduring than is rubber, or if no more than equal to rubber in its qualities the original cost must be smaller; that the weight must be no more than rubber when formed as a tire. Those who shall enter competition for the prize must submit to the Automobil-Versuchsabteilung, VI Gumpendorferstrasse, I, Vienna, Austria, a model in standard or reduced size or on



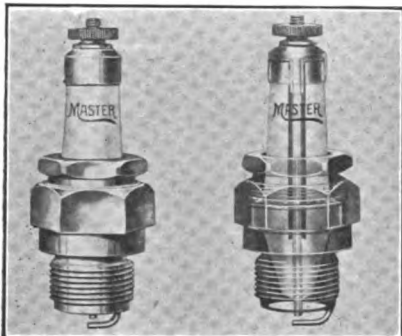
Starr-Springfield Oval Cutter, Which Will Also Cut Circles up to 15 inches.

before June 30, 1914. Information in detail form relative to the competition can be obtained by application to K. K. Kreigsministerium, Vienna, Austria.

New Commercial Car Accessories

Master Spark Plug.

The Hartford Machine Screw Company, Hartford, Conn., is manufacturing what is termed the Master plug.



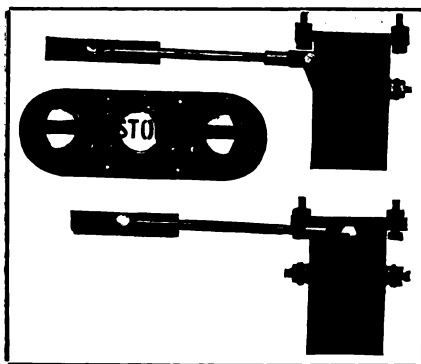
which is marketed at a moderate price because of a production in quantity and improved manufacturing facilities. The porcelain is made extra heavy and the company states that the design will withstand strains which break down ordinary insulators.

The seat for the porcelain is very wide and well cushioned, and ample margin is provided for the effects of expansion and contraction. One of the qualities emphasized in the Master plug is that it may be easily and quickly disassembled and the parts replaced without interfering with their efficiency. Throughout the best of workmanship and material is incorporated. The Master is made in standard threads and with varying lengths of base to meet the requirements of varying motor design. The company is licensed under the Canadian patent.

J-M Mobilite Signal Lamp.

The H. W. Johns-Manville Company, New York City, is marketing a practical compact signalling device, which is utilized to warn approaching vehicles of the direction to be taken by the machine, and provision is also made for notifying the other car when a stop is to be made. The new light is known as the J-M Mobilite signal lamp, and consists of three small electric lamps mounted on an aluminum base finished in ebony black. When the steering wheel is turned to the right or left, a white arrow automatically appears in the corresponding lamp, indicating the direction the car will proceed. When the clutch is thrown out, the word "Stop" appears in red letters in the centre dial of the device.

The signals are operated by self-

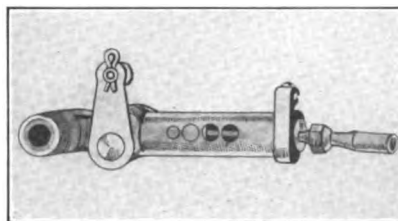


contained, water proof contact devices attached to the steering gear and the clutch. Each unit comprises a vulcanized rubber socket fitted with a special tungsten bulb and a powerful reflector. The lamps consume but little current, and can be operated economically on dry cells. An illustrated booklet on the lamps will be mailed free on request.

Empire Fuel Economizer.

The Brown-Taylor-Greene Company, Chicago, is manufacturing the Empire gasoline economizer, which differs from the conventional types of devices marketed for this purpose in that the control of auxiliary air admitted is automatically, not manually, operated and in proportion to the speed of the motor. This feature is obtained by the connection of the economizer to the throttle linkage.

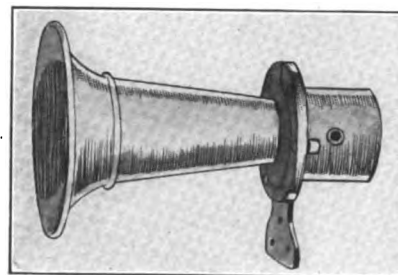
The device is very compact and well designed. The control of the auxiliary air admitted to the intake manifold is by suitably proportioned



ports, which are uncovered by a piston or plunger member, the last named being actuated by the movement of the throttle. It is held that the Empire supplies the required amount of air at all speeds. Claims of 20 to 80 per cent. in fuel economy are made.

Rexo II Electric Horn.

The Dean Electric Company, Elyria, O., which concern has marketed a number of electric signalling devices, has augmented its line with a new design termed the Rexo II. One

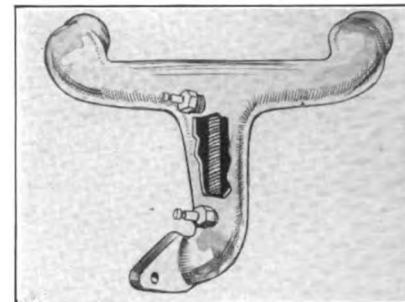


of the features of the horn is that its retail price is less than \$4. This does not mean that quality or workmanship has been sacrificed, as the company is employing the best of material and the details of construction are as carefully executed as in its higher priced horns. The extreme low price is explained by the statement that the Dean Electric Company plans a production of 100,000 during the coming season.

Several finishes are offered, these comprising the usual black and nickel, or black and brass. Two coats of enamel are applied to each horn and each is baked on, a special process being employed. The company states that the finish is weather and heat proof and that it will not chip.

Arnold Electric Plugs.

The H. W. Johns-Manville Company, Madison avenue and 41st street, New York City, is now marketing the



Arnold electric heating plugs, which are held to solve the starting problem when the motor is exposed to low temperatures. The complete equipment comprises two electric plugs and a resistance coil, the latter being inserted in the intake manifold. The location of the plugs is shown in the accompanying illustration.

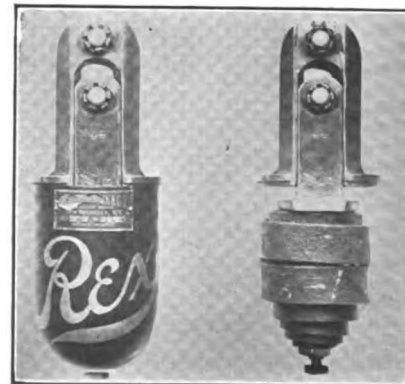
By passing a current through the coil member a high degree of heat is obtained, resulting in raising the temperature of the mixture to a point making for instantaneous and complete combustion. The heat not only makes for a complete blending of the fuel and air, but any particles of gasoline not carbureted by the carburetor are converted into useful mixture by the heat. It is this that provides the easy starting feature emphasized by the Arnold electric plugs.

The terminals of the plugs are connected to a six-volt storage battery.

Rex Shock Absorbers.

The Rex Shock Absorber Company, New Rochelle, N. Y., and Stamford, Conn., is manufacturing the Rex shock absorbers, which are designed for use on front and rear springs and for varying suspensions. A feature emphasized by the maker is the use of a double volute spring in such manner that it absorbs the upward and downward movements and with the use of but one adjusting nut.

The frame of the shackle is made in one piece and the inner fork is similarly constructed. The last named has a compact guide inside the outer frame, an arrangement that the maker states makes for great strength, as well as eliminates wear of the mechanism. The absorber spring is retained in a grease and oil tight cover, and is accessible.



BOSTON TRUCK SHOW A NATIONAL EVENT.

THE show of motor service wagons and trucks at Mechanics' building, Boston, beginning the evening of March 17 and continuing to March 21, organized by the Boston Commercial Motor Vehicle Association, will be the third exclusive exhibition of machines of the types named held in that city. Because the manufacturers decided to abandon shows of service vehicles in New York and Chicago, after two years' experience, the supposition may be that the Boston exposition will be practically a local display, but as a matter of fact the show will be national in character from every point of view.

The Boston association, before the conclusion of its second annual show, decided to organize that which will be held next month, and the preparations have been making for practically a year. The exhibition will be directed by Chester I. Campbell, who has a more intimate knowledge of the market than any other man in New England, because of his constant association with the industry and trade, and he has sought to make the show more comprehensive, and its influence greater, than ever before.

The conditions in Boston are different than in any other locality. The shows have always attracted visitors from all sections of New England and the British provinces, and the results at previous exhibitions have proven that the visitors are buyers, attracted because of their interest in the economic value of motor vehicles and the possibilities for examining and comparing types of machines that will meet requirements.

Boston is a purchasing centre. It attracts business men at all times, for it is accessible from every part of New England in a few hours. The show is held at a time when business men in large numbers visit Boston. The end of winter means that the greatest period of activity for haulage is close at hand, and transportation needs are not only pressing, but must be supplied. Instead of a period of winter inactivity and uncertainty as to demands of business later on, those having need of haulage equipment must be prepared, and decisions must be reached.

The Boston shows have always been largely productive, not from the viewpoint of making agencies or securing representatives for selling organizations, but through the sales made to those who want machines and want what will best serve their purposes. This has been true especially of the motor truck exhibitions, for much time is given over to systematic examination of exhibits by those representing large interests, relying upon the reports made by engineers. The New England business man is inclined to regard expert advice with extreme favor, and this means that personal interest or sentiment is incidental when investigations are made as to qualities.

The preparations for the truck show are practically completed. The space in Grand and Exhibition halls was long since disposed of, and practically all of the

basement has been allotted. The hall floors will be devoted largely to the representative makes of machines, for some of the exhibitors made application previous to the show of 1913 for the spaces they will show in, and this fact has transformed the basement into what may be termed a department for machines produced within a year.

While the types of vehicles will range from the cyclecar adapted for package distribution to the truck of largest size, the greatest number of machines seen will be of capacities from 1500 to 5000 pounds, with the majority of these of smaller sizes. This would appear to indicate that the industry has developed many types that can be adapted to a diversity of requirements to serve the purposes of concerns that require quick haulage of light loads, but one man being required to operate them.

Units of this design can be added to equipment to provide for a reasonable increase of business at moderate expense. The cost of operation is relatively small, and the elasticity of service and the reserve capacity is very large. Many exhibitors will feature machines of this kind, and because of the wide range of design, construction and price there is no question that a large number of visitors will be interested.

Another feature will be the progress made in body designing, for a chief thought with every vehicle builder is to furnish bodies that will meet with a general demand, while special constructions to serve individual requirements will be of much interest to those requiring equipment of unusual design.

Many trucks of even two tons capacity are now fitted with quick discharging bodies, and the development of body hoists will be a fruitful subject for study by those who have need for vehicles so fitted. There are numerous new adaptations of power, protective devices, and means of control for body hoisting apparatus, and the exhibits of these will be numerous.

Each machine will have its own characteristics of design that may have special interest, but what will be weighed with much care will be the governing devices, the protection of mechanism, the provision for lubricating moving parts, means for adjustment to compensate for wear, insurance against stresses, and other refinement details. Those purchasing machines realize that endurance is the one factor that cannot be determined, other than by design that will insure sufficient margin of strength, and proportioning of parts, so that these will not only wear slowly, but in the event of renewals, the assemblies need not be materially changed.

The show will attract the attention of the industry, because this will be the only real opportunity of the year for the engineering forces to study the machines and estimate the progressions made by the designers, and from this aspect will be a considerable influence for the advancement that shall be made in future.

FEDERAL TRUCKS FOR WAR.**Portugal Purchasing Motor Equipment for Service with Republic's Army.**

Whether or not the name Federal, which suggests a democracy and a republican form of government, was a factor in the determination of the war department of Portugal to provide Federal machines when it began to motorize the equipment of its army, the fact remains that the vehicles produced by the Federal Motor Truck Company, Detroit, were purchased.

Since the inauguration of the republic, Portugal has been under the administration of an element that was antagonistic to royalty, and there has been no sentiment prevailing that was subservient to custom, prestige or practise, and when the war department investigated the machines that would be suited to its purposes the vehicles made by European and American builders were considered impartially.

There is no question that high class trucks and wagons are built in Europe, and the war department made inquiry into the qualities of all that were regarded as being suited to its purposes. As a result of this investigation the first machine was ordered March 3, 1913, the intention being to experiment with this and to determine from its work whether or not others would be required. The machine was delivered promptly and when this had been worked for about five months decision was made to purchase four more, the order being given Sept. 25.

Before the delivery of this order, on Oct. 6, the third order for four Federals was received, and directly following the receipt the fourth order, this time for four, was sent in. With 13 trucks available the war department sent the fifth order, this time for four, which was cabled Jan. 3, and this shipment was dispatched promptly. The details of the uses made of the trucks are not known, but there is belief that they are in general transportation service for the army, although not as yet used for field purposes.

At Victoria, B. C., a company has been organized to operate a line of motor omnibuses that has capital of \$50,000, and the organizers will compete with the street railroad, which recently increased fares. The shares in the company are valued at \$1 and any person desiring can become a stockholder. The fares proposed for the omnibus line range from two to five cents.

A factory to build undertakers' motor wagons is to be established by the Keystone Vehicle Company, Columbus, O., a concern recently formed in that city with capital of \$15,000.

A dividend of 1.75 per cent. on preferred stock, payable April 1, has been declared by the B. F. Goodrich Company, Akron, O.

WILL STUDY MACY DELIVERY.**New York City Department Store Service to be Considered by Research Corps.**

The delivery service of the store of R. H. Macy & Co., New York City, is to be studied and reported on by the research department of the electrical engineering school of the Massachusetts Institute of Technology, under the direction of Instructor Harry F. Thomson, who will have the assistance of several students in the work. This will be the first instance in which a large store, or any concern, in fact, has availed itself of the practical possibilities of such work. Two years ago the institute was interested in transportation research by the Edison Electric Illuminating Company of Boston, which placed a fund at the disposal of the department, and since that time the work has been carried on, being supervised by Prof. Harold Pender.

The study of the subject up to the present time has been with a view of obtaining sufficient accurate data to justify conclusions and to determine facts with reference especially to operating cost of different types of vehicles in varying works and in variable conditions. Several reports have been published that have material value. The institute has the co-operation of a considerable number of concerns in different sections of the country, and has through systematic study and observation accumulated a valuable fund of information.

With knowledge of the work that has been accomplished the Macy company asks that an investigation be made of its delivery service, which is done by its own organization as far east as Stamford, Conn., as far north as Ossining, N. Y., as far south as Seabright, N. J., and as far west as Plainfield, N. J. The work is done by transfer from the store and warehouses to distributing stations, gasoline and electric trucks and wagons and horse trucks and wagons being utilized. In all about 400 vehicles are used and the expense of distribution is placed at close to \$1,000,000. The investigation will be continued for whatever period is necessary, and the expectation is that the result will be a report that will make recommendation of probable economies.

The Wright Storage Battery Company has succeeded the A. Bologensic Company of Poughkeepsie, N. Y., and with capital of \$100,000 will manufacture batteries with A. M. Sherer, formerly with the Electric Storage Battery Company, Philadelphia, as superintendent.

The number of exhibitors of motor trucks and wagons at the Newark, N. J., show, which will be opened Feb. 21 and continued for one week, will be extremely large, as practically every New York City dealer who has New Jersey territory will display.

STRENGTH LIMITS OF TRUCK WHEELS.

Definite Data of Extreme Value to Motor Vehicle Industry Obtained by Comparative Tests of Wood and Composite Types in Laboratory of Perdue University.

WHEEL building may be regarded as a detail of vehicle construction, but since the utilization of the motor vehicle some attention has been given to wheel designing, largely from the fact that with pleasure cars lightness and extreme strength have been demanded by those who desire speed, and that those who build trucks and wagons realize that the road stresses under loads are extreme and that liberal margins of safety should be provided.

The spoked wheel is a development from the disc that was first used in crude form and then perfected with use, the metal tire being used to minimize wear and protect the disc. The binding influence of the tire was utilized so far as possible, considering the variation in wood from climatic conditions. The expansion and contraction of wood by the absorption of moisture and drying varies considerably, and this is a factor of considerable importance.

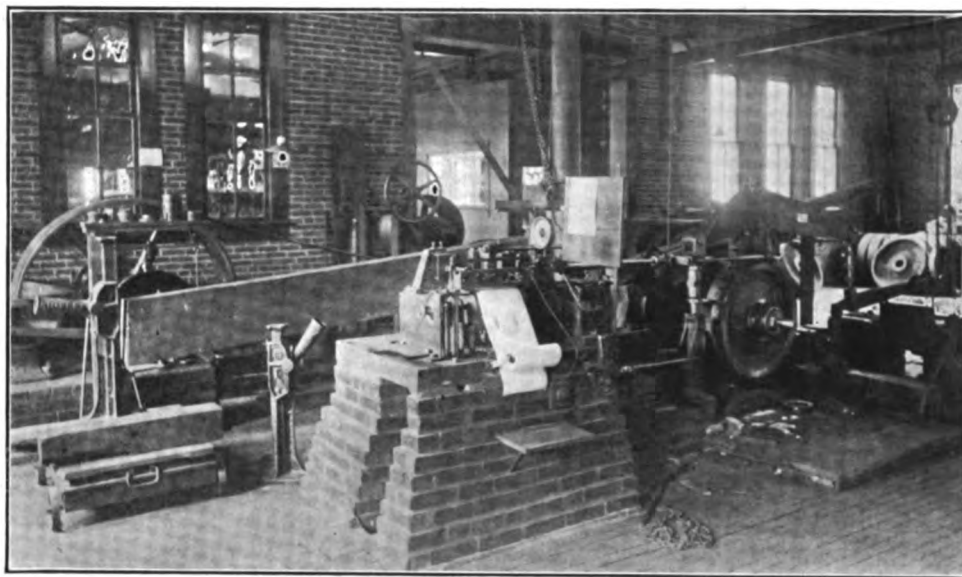
The standard wood wheel of today is a development of the type used for carts and wagons, the diameter being decreased for two reasons, the one to lower the centre of gravity of the load, and the other to minimize tire expense. Every mechanic knows that the larger the wheel the longer the lever arm, and the greater the wheel diameter the easier a vehicle of given weight can be moved on a stated surface. Theoretically, with reference to conservation of power, a large wheel is preferable to one that is small, but there are limitations because of the necessity of building the large wheel sufficiently strong to carry the weight and to endure the stresses, and there must be proportionate increase of structural material to afford this strength.

The Artillery Type Wheel.

The motor truck wheel is generally designated as "artillery type", which means that the design is regarded as similar to that used for wheels for field artillery gun carriages and caissons, and implies to the engineer a heavy construction that is intended to endure the varying conditions of rough road haulage and the extreme shocks from the discharge of the cannon. This design has been more or less modified by the builders of trucks, and one can say that there is little resemblance between the wheels of motor wagons and

those used for military purposes, but the general term has been applied and it has been accepted as meaning practically any modification of wheels as found in motor service vehicles.

In theory the ideal wheel is simple. In practise the construction that will embody every quality and have none of the faults has been vainly sought. That this is so is not strange, for practically every engineering subject studied has led to the establishment of factors that must necessarily be regarded. The period the development of wheels has been attempted is exceedingly brief, and there are those who have sought to improve the wooden wheel, while others have directed their endeavors toward the creation of what would appear to have the desirable qualities. That wheel design is a matter of real importance, and is not a mere

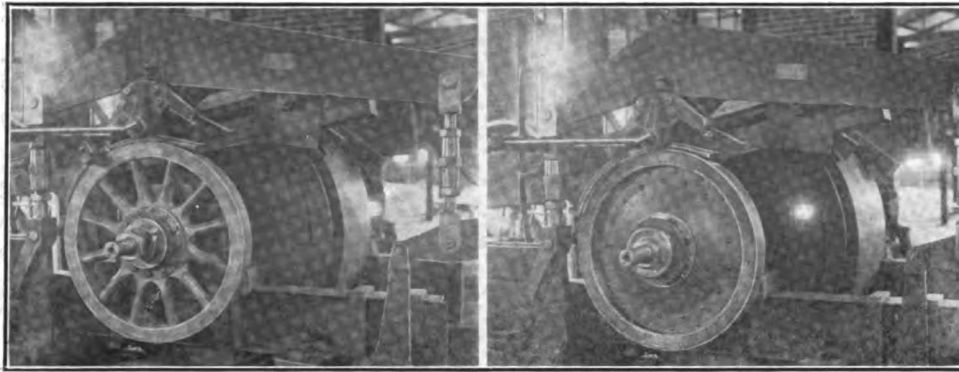


The Master Car Builders' Machine, Perdue University Engineering Laboratory, Used with Attachments Shown for Torsion Tests of Truck Wheels.

detail of vehicle building, is evident from the attention given to development both in this country and abroad.

Metal Wheels Abroad.

That European engineers have more closely investigated metal wheels is not so much from the lack of wood that is suitable for construction as from the fact that study of the subject demonstrated the need of the application of engineering principles, and so far as scientific knowledge is concerned foreign engineers have an undoubted advantage. In this connection it may be well to emphasize that French and English builders developed wire wheels for pleasure cars on scientific principles because of investigation of motor vehicle requirements, while American builders seem-



The Tested Wheels at the Completion of the Torsion Tests: At Left the Two-Ton Wood Wheel, and at Right the 1.5-Ton Indestructible Steel Wheel.

ingly contented themselves with the belief that wire construction as contrasted with wood had comparatively little justification.

When one understands that the wheel building industry has attained considerable proportions, is well established, and that wood has seemingly met all requirements so far as known, a proposed change to metal would not be favored by wheel builders, and engineers who have little or no knowledge of metal construction would not advocate adoption of what was unknown or untried. The wire wheel was developed from bicycle design and construction, and it was first adopted because of its strength and light weight. Its development has never been closely followed, but for several years before such wheels were seriously considered in America they were used to considerable extent abroad.

About the same time that wire wheels were taken up in Europe some attention was given to metal wheels for use, but as these were in every sense experimental, a period of several years passed before sufficient data were known to justify definite statement. But as the development had been made according to engineering principles and under careful observation, the facts obtained were regarded as dependable.

American Engineers Study Problem.

Not until the success of the metal wheel builders of Europe had been made public did American engineers devote themselves to study of wheels, and this was due very generally to the assumption that the wheel manufacturers had kept pace with the demands of the industry. This statement should not be understood as a reflection, but as a reason why metal wheels have been more generally used and better understood abroad than in America. Today the number of steel wheels in service is comparatively few. Several builders of trucks have adopted them, and in three instances at least these are the creations of truck engineers, there being but two concerns making them commercially. These are all of the cast type and the metals are either steel or malleable iron.

Several wheel builders who have adopted scientific methods and engineering principles of manufacturing, have sought to obtain definite data relative to the comparative merits of their productions, and in two instances at least have had wheels tested in laboratory

tests to determine the relative strength of different sizes and designs. One association of wheel manufacturers has also secured information from laboratory trials, but these data have not been made public, the members no doubt regarding themselves as being entitled to it for their personal use.

Up to the present time, however, the facts known relate to wood wheels only, and

the only detail concerning steel wheels resultant from a test by scientific means that is known is that of cast steel wheels produced by the Sheldon Spring & Axle Company, which were tested before a committee representing the Society of Automobile Engineers early in 1913. This concern had developed a wheel that was regarded as being sufficiently perfected to justify its production commercially, and the company arranged the test for the purpose of demonstrating the strength of the material and the quality of the design.

This test was first to determine the strength of the wheel for resisting deflection from shock applied to the rim, and to learn the strength to resist distortion from a constant pressure. In the first instance the application might be likened to the effect of a shock, as when a machine skidded and came in contact with an immovable object, and the other was to determine the quality of the wheel to a finality or destruction. By measuring these forces very accurate determination could be made. The one test was that of a dynamic pendulum, the wheel being immovably fixed and the weight being swung back to specified distances and released, this affording definite measurement of the impact. The other was by the application of a hydraulic jack by which a pressure of 25 tons was brought against the rim of the wheel, this being held in a mammoth clamp, the pressure being so applied that the wheel was resisting it from the hub to the periphery on one side only. The extent of deformation of the wheel subjected to the pendulum test and the weight of the blows gave data for the one test, and the pressure necessary to distort the wheel was the information developed by the other. The condition of the metal following the tests indicated the degree of resistance and whether or not fractures developed. Obviously the tests were much more severe than would be realized in normal service.

Tests of wood wheels have been with a view of developing the resistance to "dishing" strains, and compression strains. In the former the wheel rims were supported at the rim on three or four points and the pressure applied at the hub, on the outside of the wheel, against the initial dish. The compression or loading strain was applied by placing the wheel vertically and applying pressure on the rim between two spokes to such extent that the rim was broken, or di-

rectly upon the rim so that the load was borne by a spoke.

A series of tests with wheels was made recently at the laboratory of the school of engineering connected with Perdue University, Lafayette, Ind., which is of extreme interest to the wheel industry, and to all using motor vehicles, because this was the first comparative trial of wood and composite wheels in America. The results were of decided value to engineers, for these establish data that may be the foundation for wheel engineering. The reason for the test was to determine the comparative value of the Indestructible wheel, which is built by the Indestructible Wheel Company, Lebanon, Ind., under patents owned by A. M. Lofland, the inventor, and manager of the company.

Construction of Indestructible Design.

The principle of the Indestructible wheel is different than anything yet created, and the construction is of two steel webs of pressed steel, these being shaped with flanges at the peripheries, and riveted together. The two flanges when the plates are united form a rim, and on this is installed a hickory felloe, and this in turn retained by an outer rim shrunk on and by rivets through the rim, felloe and flanges. The wheels that were subjected to the test were 28 inches diameter, the web plates being 24 inches diameter. These plates were of steel .125 inch thickness and were formed by having a centre hole or opening for the hub 3.25 inches diameter. The web is perfectly flat for a radius of 4.75 inches from the centre, and from this to a radius of nine inches, where the inner surfaces of the plates converge, the surface is at an angle. Then to a radius of 11.875 inches the plates contact, and at this point turn outward to form a right angle, the thickness of the plate forming the remainder of the full radius of 12 inches. The greatest width of the flange is 1.625 inches.

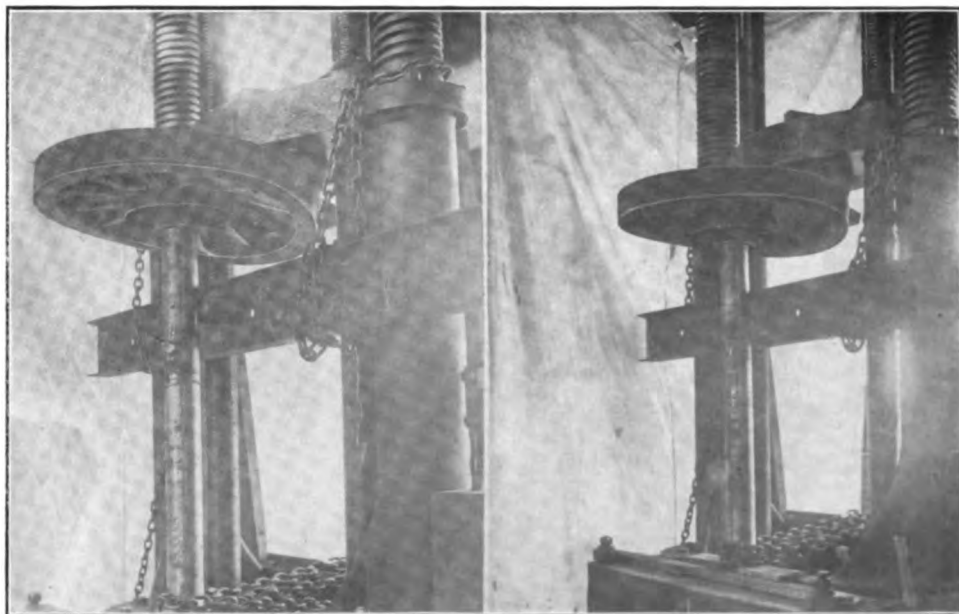
From the opening for the hub, 3.25 inches diameter, for a radius of 3.125 inches, the space between the plates is filled with a circular block of hickory wood that prevents the web distorting under pressure when the hub plates are bolted on. The block is 9.5 inches diameter and 2.75 inches thickness. The surfaces of the webs that are in contact are securely fastened with a double row of rivets, and to the flanges of the webs a hickory felloe 1.75 inches is applied, this being secured by the shrinking on of a .25-inch steel rim, the flanges being 1.5 inches width, and the felloe and the steel rim 3.25 inches width. The assembly of the felloe and the steel rim are completed by riveting. The

thickness of the wheel, at the centre, before the fitting of the hub, is three inches. The web flange, the felloe and the steel rim are .25 inch wider than the centre.

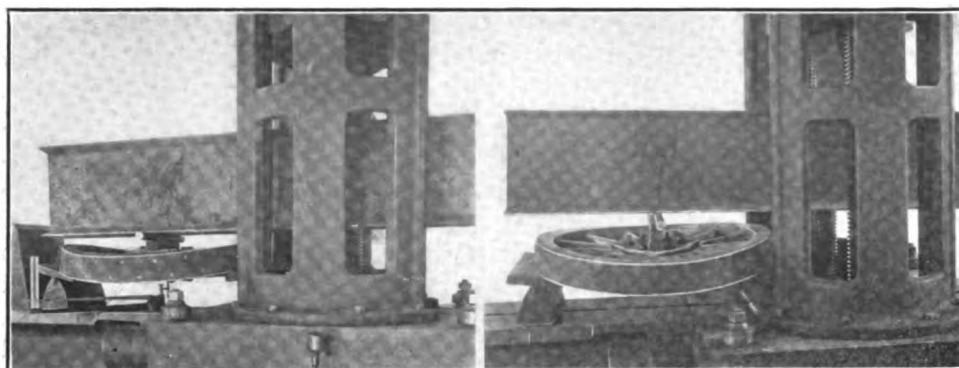
Disc wheels are not an uncommon construction and are frequently used both in this country and abroad, but this particular design is claimed to have qualities not obtaining in others. Comparatively light steel plates are used, which are given the required strength for resisting distortion by the circular block of wood at the centre, this block supporting the hub. The block, being enclosed, is not affected by climatic changes and ought to endure a very long period of time. The angle of the plates from the wood block to the point of contact of the webs is such that the construction may be likened to a truss, for the load on the axle is supported from all points. The riveting of the plates insures certain contact and equal support and resistance, and the flange has the strength of the web plate, but is reinforced by the felloe and the outer rim.

Some Advantages Claimed.

Among the claims of the inventor are that this wheel is not affected by heat or dampness, and it will not expand or shrink, that the influence of the hickory felloe deadens the vibrations, that it will endure stresses far beyond the endurance of a wooden wheel, and that protected by paint it will wear for years. But the principal result is the strength that will insure against accidents and loss of service in the event of skidding or other mishap. This wheel differs from the "built-up" wheel produced abroad in that it has a combination rim. Foreign wheel builders have constructed wheels of stamped metal, sometimes of discs and sometimes of the spoked form that are assembled with rivets. These have been designed with a purpose of securing lighter weight and sufficient strength, but one of the faults has been the wearing of the rivets and the plates or parts, so that the rivets sheared and the same result obtains as when a wooden wheel has



The Bending Test: At Left, Wood Wheel No. 1 Loaded to Maximum of 16,400 Pounds with 1.46 Inches Deformation at 16,000 Pounds; at Right, Indestructible Wheel No. 2 Loaded to Maximum of 25,400 Pounds with .60 Inch Deformation at 16,000 Pounds.



The Transverse Test: At Left, Indestructible Wheel No. 4, Maximum Load 39,575 Pounds, Deformation at 20,000 Pounds .775 Inch; at Right, Wood Wheel No. 3, Maximum Load 20,195 Pounds, Deformation at 20,000 Pounds, 1.26 Inches.

shrunk. Most, if not all, of these designs had metal rims, and experience developed the fact that a rim could be bent by a severe impact, in which event its use for a very short distance caused extreme wear on the tire.

When a wooden wheel is subjected to a shock of much severity, deformation and breakage results, but a metal wheel may be much distorted and yet can be restored to its original serviceability. The foreign "built-up" wheels have usually been of the spoked type, and the strains have been necessarily borne by the spokes and, primarily, by the rivets. Wheels of this form have been sometimes of welded sections and the fault of these has been the crystallization of the metal spokes close to the rim and eventual fracture. With a view of producing what may be regarded as uniformity of metal, cast steel wheels have been built, the purpose of the designers being to obtain sufficient strength with minimum weight. The use of steel melted in electrical furnaces has been productive of the best results, but proportioning of the castings has been found to have been a very material factor. Such wheels are of several designs, those with solid spokes and rims, hollow spokes and solid rims, hollow spokes and hollow rims, with the brake drums for rear wheels cast separately and cast integral, with partial webs and spokes of the "cored" form, and with the spokes regularly formed or fan shaped at the rim to afford greater strength and more evenly distribute the load and the road shock over the metal.

Testing Indestructible Wheels.

The tests of the Indestructible wheels were conducted by Prof. L. V. Ludy to determine the endurance under torsion stresses, and those for resistance to bending and crushing by Prof. W. K. Hatt, the former being director of experimental engineering, and the latter in charge of the laboratory for testing materials. The torsion test consisted of subjecting a wooden wheel and an Indestructible wheel to a constant vertical load of 10,000 pounds. The wooden wheel was of 28 inches diameter, being designed for service with a two-ton wagon. The Indestructible wheel was designed for a 1.5-ton wagon. The wooden wheel had 12 spokes, the dimension of each spoke at the entrance to the felloe being 1.75 by 2.25 inches. This wheel has a felloe 1.75 inches thickness and a

steel rim .25 inch thickness. The Indestructible wheel was such as has been described. Each wheel was fitted with a hub of standard type to receive the short shaft used. The weight of the wooden wheel was 81.5 pounds and of the Indestructible wheel 128.5 pounds.

There being no torsion testing machine in the laboratory of sufficient capacity to test the wheels to destruction

in the manner desired, use was made of the Master Car Builders' brake shoe testing machine, which is part of the regular equipment. This machine consists of a large cast iron drum mounted on a shaft to which is fitted a car wheel. The machine is so designed that any brake shoe pressure can be applied and the frictional resistance offered to the motion of the wheel can be recorded on a roll of paper. A steam engine gives any desired speed to the car wheel. In utilizing this machine for the tests the engine and the recording instrument were disconnected. The wheels in turn were mounted on the main shaft, clamped in position and subjected to a vertical pressure on the upper side of the wheel, by means of a brake shoe and suitably arranged levers, of 10,000 pounds. This pressure was chosen as that which would probably represent the possible maximum pressure to which the wheels might be momentarily subjected, when in service. A large wood beam was securely clamped to the side of the cast iron drum of the machine, which served as a lever for applying a torque to the wheel. A track jack placed on a platform scale, was so arranged that it was possible to lift the large lever, thus rotating the drum and shaft of the machine to which the wheel was securely fastened.

The wheel in each case was prevented from rotating by a steel cleat bolted to the rim, which came in contact with the end of the brake shoe bearing upon the rim of the wheel. In bolting this steel cleat to the rim of the wood wheel, two .625-inch bolts were used, and four .5-inch bolts were used for bolting the cleat to the Indestructible wheel. By determining the load on the platform scale, it was possible to compute the torque at any instant, to which the wheel was subjected. The first portion of the reading was taken with the lever 131 inches in length, while in the latter portion a length of 132 inches was employed.

How Readings Were Made.

Prior to any readings for record, a steel roller two inches in diameter was placed between the brake shoe and the wheel rim, immediately above the centre of the truck wheel. When in this position a pressure of 10,000 pounds was applied and the load on the scale determined, which would cause a slight movement of the shaft. This gave a calibration figure which was considered in the test work and which eliminated the

force necessary to overcome the friction and the weight of the lever. In conducting the test of each wheel, different loads were applied to the end of the long lever by means of the track jack and the corresponding angular movement of the rim of the wheel to the hub was determined. The angular movement of the wheel was measured at four different points on the rim, approximately at 90 degrees apart, at the top, bottom, right and left. In addition to determining the reading of the weight on the platform scale, readings were taken of the spring balance connected to the end of the jack lever, which indicated the vertical pull necessary to raise the end of the long lever. The following were the results obtained:

Wood Wheel.				
Reading No.	Corrected Load at End of Lever in Pounds	Torque Subject to Wheel in Inch-Pounds	Average Movement of Rim Relative to Hub at a Radius of 13 In. in Inches	Average Angular Distortion of Wheel in Deg.
1	179.0	13,449.0	0.0275	0.1212
2	468.5	61,373.5	0.0550	0.2425
3	668.5	87,573.5	0.0750	0.3309
4	861.0	112,791.0	0.1000	0.4409
5	1,058.5	138,663.5	0.0925	0.4080
6	1,209.5	158,444.5	0.1400	0.6172
7	1,408.0	184,448.0	0.2100	0.9260
8	1,545.5	202,460.5	0.2800	1.2340
9	1,605.5	211,926.0	0.3200	1.4115
10	1,801.5	237,798.0	0.4075	1.7975
11	1,998.5	263,802.0	0.6800	2.9989
12	2,065.5	272,646.0	0.8050	3.6391
Indestructible Wheel.				
1	502	66,264	0.0000	0.0000
2	995	131,340	0.0225	0.0992
3	1,482	195,624	0.0675	0.2978
4	1,982	261,624	0.0950	0.4190
5	2,126	280,632	0.1075	0.4780
6	0	0	0.0750	0.3309

In carrying out the test, it was developed that the testing apparatus was not of sufficient capacity to test the wheels to destruction. Little or no apparent damage to the wheels resulted. In the case of the wood wheel it was found that at a torque of 140,000 inch-pounds, the spokes were slightly bent, and were beginning to show a slight movement in the hub. It was assumed that at this torque the wood wheel had reached the safe limit. After subjecting the wheel to a torque of 272,000 inch-pounds, the slipping of the spokes in the hub was very noticeable, but the wheel did not completely fail. The indications were that the wheel would have carried very little more torque without complete failure.

The Results Obtained.

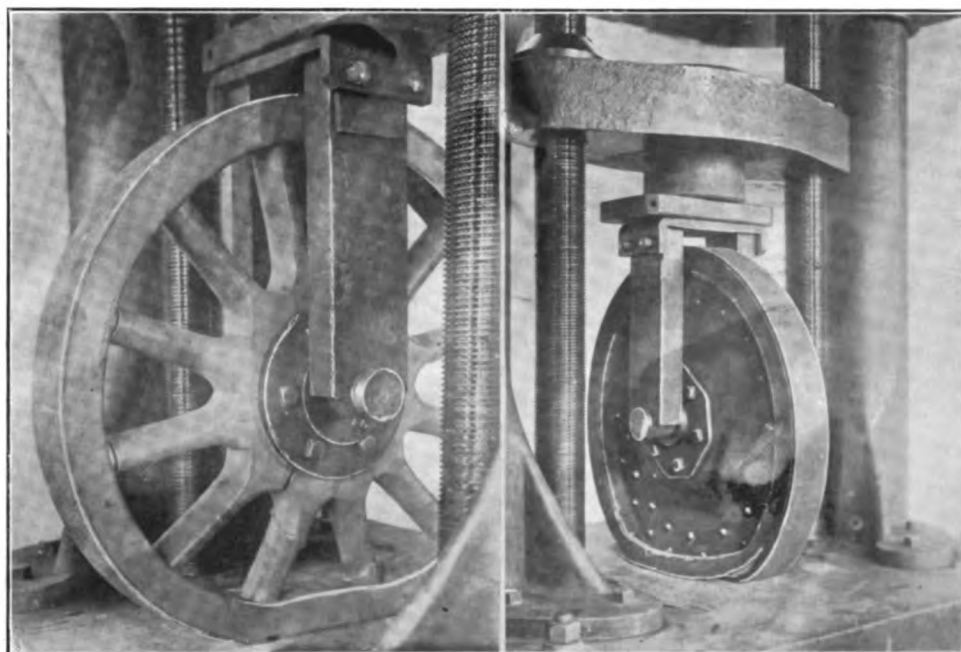
The results obtained from the test of the Indestructible wheel indicate that the maximum of strength was not reached, even though the torque of more than 280,000

inch-pounds was carried. In reducing the torque to zero after the maximum amount obtainable had been reached, a set of 0.3309 degrees was indicated. The conclusion is reached from the set resulted from the slight movement of the different parts of the wheel. The test did not damage the wheel in the least, so far as a careful inspection could reveal, and it was believed a fair assumption that the maximum load did not strain it beyond the safe limit. Assuming that the safe torque which the wood wheel would safely carry under the conditions is 140,000 inch-pounds, and that which the Indestructible steel wheel will carry under similar conditions, is 280,632 inch-pounds, and that these wheels be used on a motor truck travelling at a maximum speed of 15 miles an hour, the conclusion is reached that the safe horsepower which could be transmitted by the wheels would be as follows:

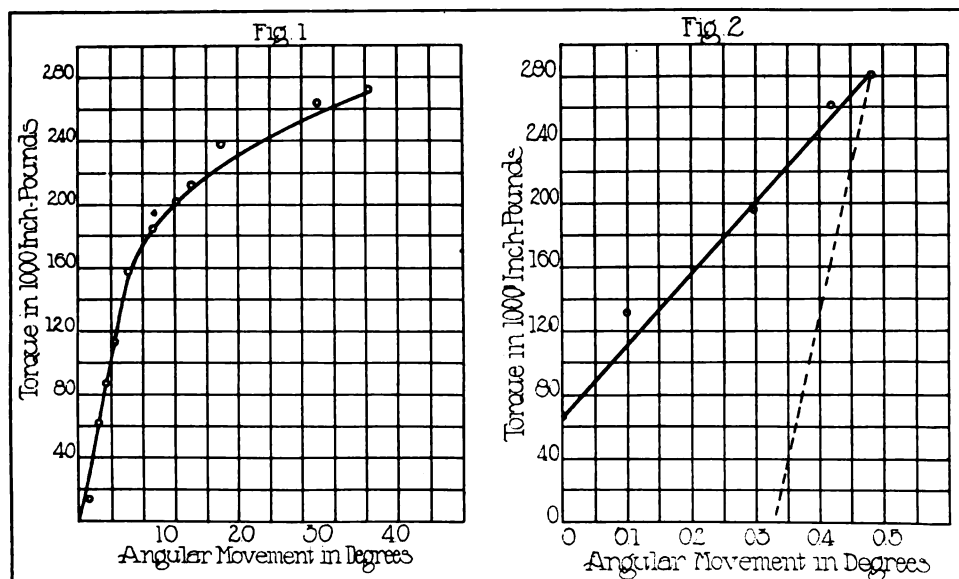
Capacity of wood wheel.....329.4 horsepower
Capacity of Indestructible steel wheel.....660.3 horsepower

Of practical interest is the recorded rim pressure as indicated by the running logs of these tests and the results, which are shown as follows:

Wood Wheel.						
Reading No.	Force on Platform Scale in Pounds	Movement of Rim of Wheel at Radius of 13 Inches in Inches			Vertical Pull on Jack Lever in Lbs.	
		Top	Right	Bottom	Left	
1	700	.04	.01	.04	.02	5.5
2	1,000	.07	.04	.06	.05	16
3	1,200	.09	.06	.08	.07	16
4	1,400	.12	.09	.10	.09	23.5
5	1,600	.17	.14	.09	.15	26
6	1,800	.23	.18	.05	.20	32
7	2,000	.30	.24	.04	.26	33.5
8	2,140	.38	.30	.10	.34	36
9	2,200	.45	.34	.13	.38	36
10	2,400	.50	.41	.23	.49	40
11	2,600	.79	.68	.49	.76	43
12	2,650	.94	.81	.62	.93	26
Indestructible Wheel.						
1	1,000	0	0	0	0	16
2	1,500	.03	.02	.02	.02	23
3	2,000	.08	.06	.06	.07	36
4	2,500	.10	.09	.09	.10	36
5	2,650	.10	.11	.11	.11	42
6	0	.07	.09	.07	.07	0



The Service Load Test: At Left, Wood Wheel No. 5, Maximum Load 64,350 Pounds, Deformation at 20,000 Pounds .24 Inch; at Right, Indestructible Wheel No. 6, Maximum Load 107,250 Pounds, Deformation at 20,000 Pounds .08 Inch.



With the wood wheel there was a noticeable bending and slipping of the hub. The movement of the rim commenced increasing rapidly at 1550 pounds on the platform scale. The test was discontinued because of reaching the capacity of the machine. The force on the scale required to move the wheel and shaft, with 10,000 pounds pressure on the wheel, was 521 pounds, with a vertical pull on the jack lever of 5.5 pounds, and a roller bearing on the rim of the wheel.

With the Indestructible wheel there was a noticeable slipping of the rivets at a pressure of 2170 pounds. The force on the scale required to move the wheel and shaft, with 10,000 pounds pressure on the wheel, was 483 pounds, with a vertical pull on the jack lever of one pound and a roller bearing on the rim of the wheel.

As the torsion test exerted pressure upon the rim to a point that would probably never be reached in actual service, for the deduction as to power transmission will demonstrate this, although destruction was not resultant, the data are of extreme interest. Attention may be directed to the data on the movement of the rims, which indicate that while this was decidedly variant with the wood wheel, there was practically uniform movement shown by the test of the Indestructible wheel.

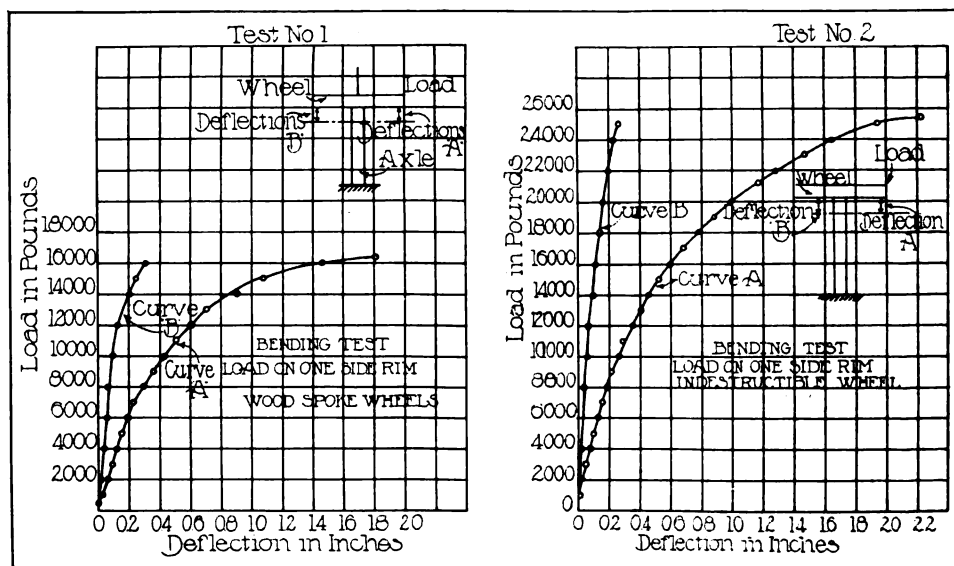
The second series of tests were of three wood wheels and three Indestructible wheels, each of the same size and construction as those described, the experiments being to determine the strength of the wheels under bending strains, the load being on one side of the rim, a transverse test, and a service position test, with the load carried vertical on the axle. Of these, those numbered 1, 3 and 5 were wood, No. 1 weighing without hub or

bushing, 44.5 pounds, No. 3 and No. 5 weighing as tested 63.5 and 70 pounds respectively, and those numbered 2, 4 and 6 were Indestructible wheels, No. 2 weighing without hub or bushing 90.5 pounds, and No. 4 and No. 6 weighing 112.5 and 119 pounds respectively as tested.

The first or bending test, with the load on one side of the rim, was intended to approximate the conditions of loading when a truck skidding sideways is suddenly stopped by the wheel coming into contact with some solid obstacle. For

this test the wheels were fitted with two centre plates and supported by a solid axle placed vertically in the machine. The load was applied to the rim on one side at a distance of 12 inches from the centre of the supporting axle. The deformations of the wheel were determined by measuring the distance up to the rim from a straight edge clamped to the axle and extending across the wheel parallel to it. The accessory fittings, disposition of the machine and the methods of loading were the same in the tests of both kinds of wheels.

In the transverse test the transverse strength and stiffness of the wheels were determined. The wheels were mounted horizontally in the testing machine and supported at opposite points on the rims by two knife-edge bearings spaced 26 inches apart. Plates one inch thick, six inches width and 12 inches length were placed between the rims and knife edges to prevent local failure at the supports. The load was applied to the centre of the wheel by means of an inch steel roller placed parallel to the knife-edge supports. The deflection of the centre of the wheel downward was taken by means of a deflection instrument reading to .001 inch.



For the service position test, with the load vertical on the axle, the purpose was to approximate the conditions that would be met with in service when a loaded truck is standing still. The load would be applied to the wheel downward to the axle. The wheels were mounted vertically in the testing machine with the tire resting directly on the weighing table. A short dummy axle was applied directly to the hub, a bushing fitting the hub and carrying the axle. A yoke of two side members bolted to a top or crown piece was arranged with the ends of the side members carried on the ends of the dummy axle. The downward pressure was applied at the top of the yoke, this being graduated to any desired maximum. The movement of the rim with respect to the hub was read in four directions: Hub to top of wheel, hub to bottom of wheel, hub to right side of wheel and hub to left side of wheel. The method of applying the test and mounting the wheel was the same in the case of both wheels tested.

The data obtained in these tests were as follows:

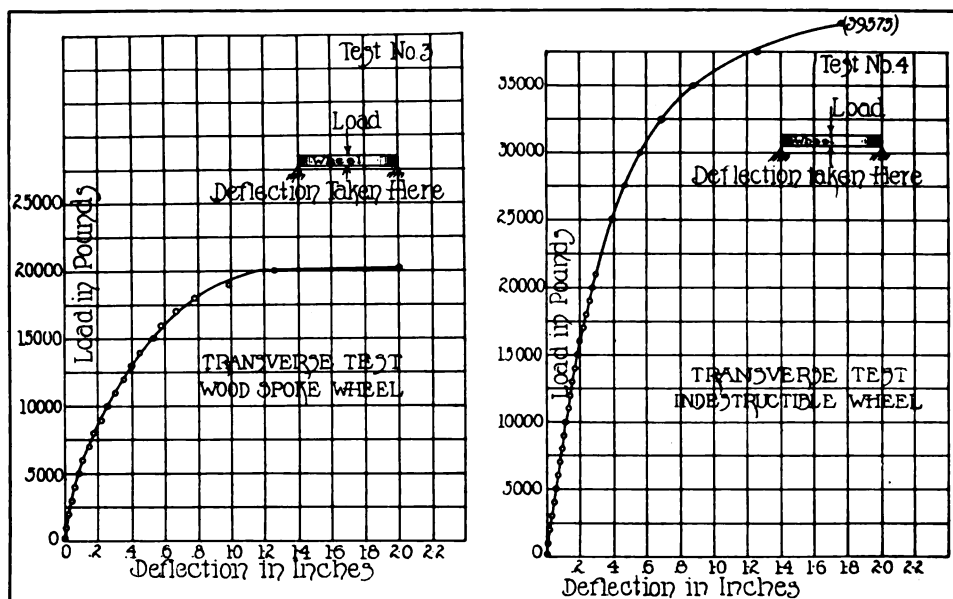
Bending Test, Wheel No. 1.

Load in Pounds	Rim Movement in Inches	
	Downward Under Load	Upward on Opposite Side
500	.00	.00
1,000	.03	.01
2,000	.06	.02
3,000	.09	.03
4,000	.12	.04
5,000	.15	.05
6,000	.19	.06
7,000	.23	.08
8,000	.30	.07
9,000	.36	.09
10,000	.43	.10
11,000	.51	.12
12,000	.61	.13
13,000	.71	.16
14,000	.91	.21
15,000	1.08	.25
16,000	1.46	.32
16,300	1.81	
.....	3.40	
500	2.19	

At pressure of 13,000 pounds a loud report indicated failure or slipping at a point not located. The maximum load applied was 16,300 pounds. The permanent set after the load was released was 2.19 inches. Five spokes were broken in tension on top near the centre plate. The felloe and tire were badly warped, but were not otherwise damaged.

Bending Test, Wheel No. 2.

Load in Pounds	Rim Movement in Inches	
	Downward Under Load	Upward on Opposite Side
500	.00	.00
1,000	.01	.00
2,000	.02	.01
3,000	.05	.01
4,000	.08	.02
5,000	.10	.02
6,000	.13	.03
7,000	.16	.04
8,000	.19	.04
9,000	.22	.05
10,000	.27	.06
11,000	.29	.07
12,000	.36	.07
13,000	.41	.09
14,000	.46	.10



15,000	.53	.11
16,000	.60	.12
17,000	.69	.13
18,000	.79	.15
19,000	.89	.17
20,000	1.00	.17
21,000	1.18	.18
22,000	1.29	.20
23,000	1.47	.22
24,000	1.65	.24
25,000	1.95	.27
25,400	2.23	
.....	4.00	
500	2.75	

At pressure of 10,000 pounds a loud internal report indicated slipping or failure beginning. At pressure of 15,000 pounds a second internal report was heard. At pressure of 20,000 pounds a third internal report was heard. The maximum load applied was 25,400 pounds. The deformation was carried to four inches. The permanent set was 2.75 inches. In the test the rim and web plates were bent downward and eight rivets through the web plates were sheared.

TRANSVERSE TESTS.

Wood Wheel.

Load in Pounds	Hub Movement in Inches
200	.000
1,000	.010
2,000	.024
3,000	.041
4,000	.061
5,000	.088
6,000	.110
7,000	.147
8,000	.177
9,000	.218
10,000	.260
11,000	.305
12,000	.355
13,000	.400
14,000	.455
15,000	.533
16,000	.580
17,000	.670
18,000	.785
19,000	.988
20,000	1.260
20,195	2.030

Indestructible Wheel.

Load in Pounds	Hub Movement in Inches
200	.000
1,000	.009
2,000	.020
3,000	.034
4,000	.046
5,000	.058
6,000	.068
7,000	.079
8,000	.091
9,000	.102
10,000	.114
11,000	.128
12,000	.140
13,000	.152
14,000	.168
15,000	.186
16,000	.200
17,000	.218
18,000	.235
19,000	.255
20,000	.275
21,000	.285
25,000	.395
27,500	.475
30,000	.560
32,500	.692
35,000	.870
37,500	1.260
39,575	1.750

With the wood wheel at a pressure of 6,000 pounds a report indicating slipping at a point unknown was heard, and the special hub plate was bending. At 12,000 pounds pressure a second report was heard. At failure the wheel was warped downward at the hub and the rims. The felloe was split on the line of the spokes at both sides of the wheel midway between the supports.

With the Indestructible wheel at about 22,500 pounds load the metal in the webs and tire reached its yield point. A report was heard indicating slipping or beginning of failure. At failure the wheel was badly warped, the metal in the web plates and the tire having reached its yield point.

SERVICE LOAD TEST.**Wood Wheel.**

Load in Pounds	Deformation in Inches from Hub to Tire			
	Bottom	Top	Right	Left
1,000	.00	.00	.00	.00
4,000	.00	..	.00	.00
6,000	.03	..	.02	.03
8,000	.03	..	.01	.03
10,000	.05	..	.00	.02
15,000	.12	..	.01	.02
20,000	.24	.00	.04	.03
22,000	.36	.00	.07	.03
30,000	.46	.01	.00	.03
35,000	.53	..	..	..
40,000	.58	..	..	..
47,500	.67	..	..	..
51,000	.71	..	..	..
56,000	.76	..	..	..
64,350	..	..	..	..
After release of load	1.28	.01	.25	.05

Indestructible Wheel.

Load in Pounds	Deformation in Inches from Hub to Tire			
	Bottom	Top	Right	Left
1,000	.00	.00	.00	.00
5,000	.04	.02	.02	.02
10,000	.04	.00	.00	.00
15,000	.07	.01	.02	.01
20,000	.08	.00	.04	.01
25,000	.10	.00	.05	.02
30,000	.18	.00	.05	.03
35,000	.20	.00	.04	.03
40,000	.25	.00	.04	.01
45,000	.38	.01	.04	.01
50,000	.45	.01	.04	.01
55,000	.53	.01	.07	.01
60,000	.62	.00	.07	.04
64,350	.69	..	..	..
70,000	.73	.02	.07	.04
85,000	1.21	..	..	..
88,500	1.34	..	..	..
92,650	1.43	..	..	..
95,340	1.67	..	..	..
107,350	..	..	..	..
Set after release of load	2.15	.02	.14	.16

The wood wheel was supported at the tire at a place semi-distant between two spokes. Up to 25,000 pounds the deformation was entirely a flattening of the rim between the two bottom spokes. The maximum load was 64,350 pounds. Up to a load of 25,000 pounds the rim flattened out between the two bottom spokes, but after that load was reached the spokes were in more direct compression. The two bottom spokes finally failed in compression at the maximum load. The rim pulled away slightly from the spokes on both the right and left sides of the wheel.

With the indestructible wheel the rim and the tire began to flatten at the bottom point of contact at about 15,000 pounds. At a load of 40,000 pounds the flat spot on the tire was five inches length, and at 64,350 pounds the flat spot was 7.5 inches length. The maximum load was 107,250 pounds and the deformation from hub to tire was carried to 2.7 inches. After the load was released the flat spot of the tire was 16.5 inches length. The failure of the wheel was the flattening of the felloe and tire 16.5 inches. The web plates were crushed down

through the felloe and then buckled outward and one web rivet was broken. The felloe bulged outward on each side, right and left, breaking 12 rivets in tension.

The comparison of the tabulations shows the relative strength of the wheels, and that the crushing of the wood felloe was the initial cause of failure, although the buckling of the web plates followed. Assumedly one point of the composite wheel was as strong as another, but the weakest part of the wood wheel was selected—that being between the spokes.

WHERE SALESMEN ARE TAXED.

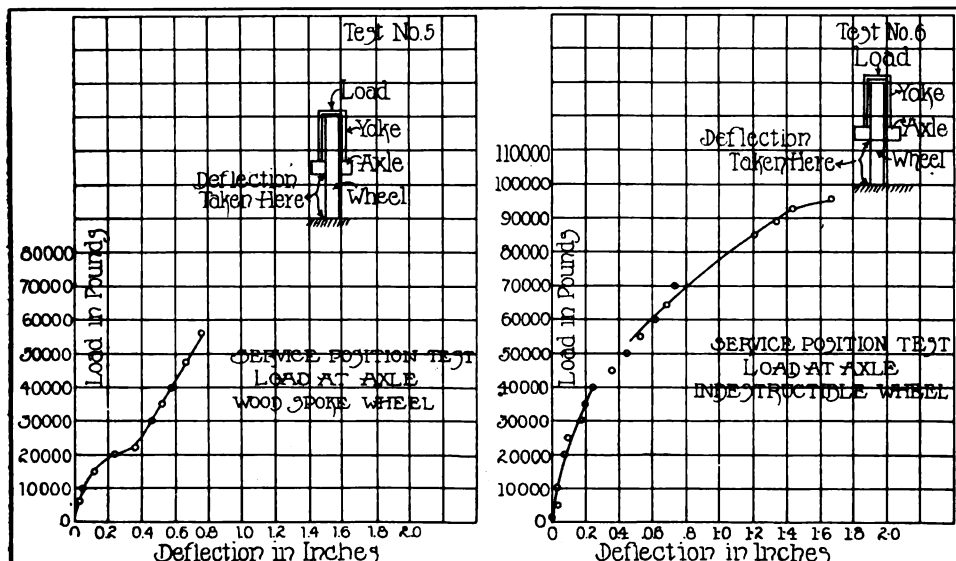
A great deal of valuable information relative to the conditions that must be met by salesmen traveling in South American countries can be procured in the report on "Commercial Travellers and Samples in South America", which can be obtained for five cents a copy from the superintendent of documents, Government Printing Office, Washington, D. C. Remittance must not be made in postage stamps. The license taxes usually imposed in these countries, the amounts, conditions in which samples may be temporarily admitted free of duty, and suggestions of decided benefit are included in this report.

TRUCK WIDTH LIMIT FIXED.

The city council of Providence, R. I., has enacted an ordinance limiting the width of all vehicles using the streets of the city, to seven feet eight inches, and permitting the commissioner of public works to issue permits for the temporary or constant use of vehicles of greater width in certain streets. This is an amendment of an ordinance that fixes the limit of load capacity at 10 tons, and assumedly no provision has been made for the transportation of larger loads under any circumstances.

EXCLUSIVE ELECTRIC GARAGE.

A garage intended exclusively for electric vehicles, both pleasure cars and service wagons, has been established by the Electric Vehicle Service Company, Saginaw, Mich., at Germania avenue and South Second street, where any form of attention required will be given. The garage has storage capacity for about 100 machines and it has equipment that will afford high class service and maximum efficiency at minimum expense. The company has installed a motor-generator of 30 kilowatt capacity and switchboard, and it now has facilities for charging 50 batteries in 24 hours. The garage has already a liberal patronage.



VULCO QUICK ATTACHABLE TIRE.**New Truck Shoe With Cushion Joints That Absorb the Rolling Strains.**

The claims made for the Vulco quick attachable truck tire, made by the Vulcan Rubber Company, Erie, Penn., are that this construction combines the qualities of the block, solid band and demountable types, these being based on the results that have been developed from practical tests. The simplicity, ease of application and endurance efficiency are factors of decided value. The tire is built to the S. A. E. standards, fitting the standard rim and fastening with the standard bolted-on flange. The tire is seated immediately on the felloe band, there being no extra rim or wedge rings used.

The metal base is formed of individual steel sections about six inches length, which are so spaced that the soft rubber may flow between. This creates a cushion joint between each section that absorbs the rolling strain and prevents loosening of the tread. This series of joints also insures ease of application, as the joints give slightly and the tire can be applied or removed by simply jacking the wheel. No special tools are needed. The metal sections are concave in form, which lightens the tire from 10 to 15 per cent., and also raises all the wearing surface above the side flanges.

The face of each individual section is honey-combed with expanding corrugations or holes. When cured, the hard rubber flows into these holes and is dovetailed when solidified. The holes in the sections extend crosswise and lengthwise. When the hard rubber has been cured into the holes the result is a compound waved surface, which has a double area union of hard and soft rubber, which has nearly double the adhesive strength. This tire is made in either band or block type and can be used either single or dual. The tire is the invention of C. A. Swinehart, who is well known in the tire industry. The statement is made that the tire has been given very complete tests with extremely satisfactory results.

The National Cartage Company, Detroit, Mich., has since Oct. 8 been using a four-ton KisselKar truck hauling steel for truss concrete construction, operating it constantly, the crew working eight hours and three shifts of men being employed. The length of the haul is 1.5 miles and the daily tonnage is about 79 tons. No repair or adjustment was necessary until early in January, and the work required then was of minor consequence.

Motor trucks will be shown at the annual exhibition of automobile vehicles to be made by the Portland, Me., Automobile Dealers' Association, which will take place in the city building in Portland, Feb. 9-14.

TRUCK SHOW AT DETROIT.**Large Display at Annual Exhibition and Unusual Interest Manifested.**

The department devoted to the display of service vehicles at the annual exhibition of automobiles at Detroit, at the Ford branch building in that city, Jan. 17-24, was of extremely large proportions as compared with previous years, and the attention devoted to this class of machines was surprising, even to those who looked forward with anticipation based on intimate knowledge of conditions. The show was local in the sense that the exhibitors were agents, but the attendance was drawn from all sections of the state and the adjacent parts of Canada, and the business men found much to occupy them in examination of the vehicles displayed.

The number of exhibitors was 10, but two of them showed three makes each, the total of different machines being 14. These included the Buick, Packard, Wagenhals, Federal, Universal, Studebaker, GMC (both gasoline and electric), Tribune, Star, O. K., International, Pull-More, Commerce and Kelly. Practically all of these were known, the Tribune, Star, O. K. and Pull-More being developments since the last show.

Of these the Pull-More is a novelty in that it is a two-wheeled tractor coupled with a frame mounted on two wheels carrying a body adapted for the special purpose used. It is built by the Pull-More Motor Truck Company, Detroit, Mich. The front section or chassis is mounted on springs, the frame carrying the motor, clutch, transmission and jackshaft, and from the jackshaft the power is transmitted by chains to sprockets on the forward wheels. The motor and transmission gearset are incorporated in a single assembly, with which is included the cooling, lubricating and steering systems, and the radiator, hood, tank and seat may be lifted so that the mechanism may be reached for examination or work. The motor is a four-cylinder type with cylinder bore of 3.75 inches and stroke of 5.5 inches, the clutch is a cone, and the gearset will allow three forward speed ratios and reverse. The machines are fitted with 34-inch wheels, shod with four-inch tires. The standard wheelbase is 117 inches. The vehicles are built with one and two-ton capacities. The chassis is coupled to the body by a hinged device that compensates for strains that might be caused by road conditions.

The Croce Automobile Company, Asbury Park, N. J., builder of Croce motor wagons and trucks, has elected the following officers: President, Samuel A. Reeves; vice president, Albert Robbins; treasurer and secretary, Harry A. Watson; directors, Samuel A. Reeves, Albert Robbins, Harry A. Watson, Charles R. Zarharias, Louis P. Croce, Richard W. Herbert, Samuel A. Patterson, John Steins and A. G. Arbrand.

USE AND ABUSE OF MOTOR TRUCK TIRES.

S. V. NORTON, sales manager of the truck tire department of the B. F. Goodrich Company, Akron, O., was the principal speaker at the January meeting of the Motor Truck Club of America, held in New York City, making the trip to the Metropolis to address the organization. His talk was of considerable length and it was illustrated by lantern slides that had been prepared to show not only the collection of rubber and its manufacture into tires, but the use, care and conservation of tires. The attendance was very large and much interest was manifested, a considerable number of truck owners being present for the purpose of learning first hand facts that might be of material value to them.

Mr. Norton impressed upon the gathering that the function of the truck tire was to promote traction, to cushion the mechanism and to minimize the vibration. He stated that while rubber for tire material had not been perfected and the possibilities of the material had not yet been fully developed, yet it was the best substance that was known to those who manufactured tires. After considering manufacturing he turned to the manner of tire use and by views illustrated the effects of excessive wear and abuse, and made suggestions how these can be avoided. He pointed out the results from overloading, fast driving, skidding, driving in car tracks, driving over bad roads, the use of rigid skid chains and similar devices, running with wheels out of alignment and general neglect of small cuts and abrasions. He showed that owners are too

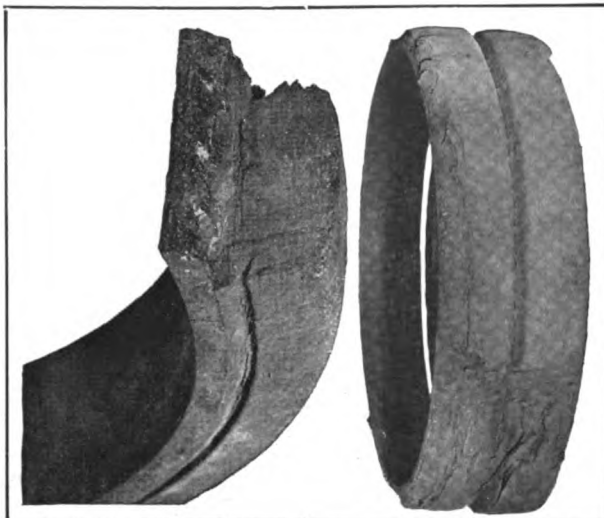
careless of tires, first allowing their trucks to be under-tired to save expense, then using trucks intensively in violation of the normal requirements for which the tires are made. He stated that these abuses rapidly break down the tires, often rendering them useless, while there is yet in the actual structural material thousands of miles of wear.

Urges Frequent Inspection.

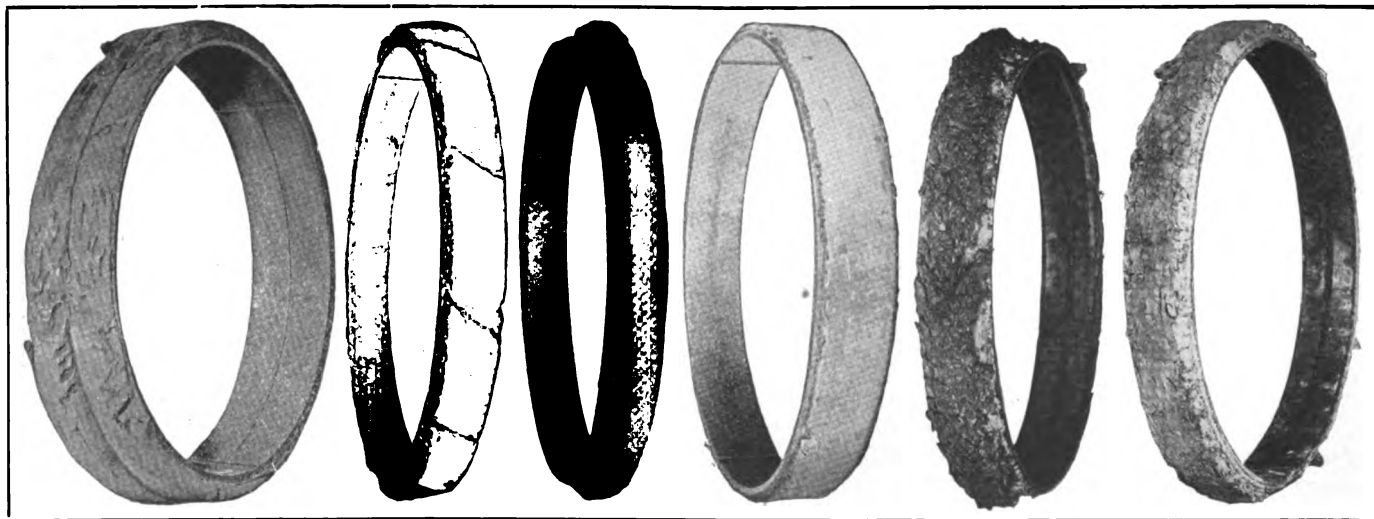
He urged that owners awake to the recklessness of their course, both in their own behalf and in fairness

to the tire manufacturers, who are as anxious as owners to make tires more efficient. In general he felt that at the outset a truck should be equipped with as large tires as practicable, rather than the smallest, and that speeds and loads be kept within rational bounds. He believed that if owners would frequently inspect their tires, maintain watch over the driving habits of their chauffeurs and consult the tire maker freely, longer life and better results would be obtained by all truck owners.

During the period when the members and Mr. Norton exchanged questions and answers much of the most valuable information came out. It met the views and problems of owners on their own ground. Among other ideas Mr. Norton expressed was that average speeds up to eight or 12 miles were most conducive to solid truck tire life and efficiency, but that speeds in excess of that were specially ruinous. He admitted that the effect of "trailers" on tires is as yet uncertain, due to lack of experience in this country, and agreed



At Left: Ruptured from Overloading. At Right: Failure from Neglected Cuts.



From Left to Right: Torn by Skidding of Faulty Braking, Scored by Stationary Chains, Worn by Driving in Car Tracks, Result of Wheels Out of Alignment, Damaged by Excessive Speed, Used on Bad Roads.

to undertake for the club a careful investigation of the idea in Europe and other lands where trailers and tractors are more commonly used. He was unable to discover any material difference in tire wear as between steel and wood wheels, but outlined that each type has some peculiar merits of its own.

As to anti-skid chains and similar appliances, Mr. Norton said they all wear tires badly, but if so applied as to permit holding, yet gradually crawling about the periphery of the tire, rather than staying in one place, the wear is distributed so as to cause little trouble. At least, such devices appear necessary to prevent skidding and till the constant experimentation now in progress shows a better way, will probably prevail.

Worm Drive and Tires.

One question asked had to do with the effect of worm drive types of transmission on tire wear, the point raised being that the additional dead weight on the axle might materially add to the wear, whereas load carried on the springs does not. Mr. Norton stated that his observation of worm drives had been that unusually long tire life had resulted, though he could hardly say just what the reason was. Cases of 15,000 to 20,000 miles on Pierce-Arrow trucks had been recorded by his company.

As to the preference for solid or pneumatic tires, he stated that the chief objection to pneumatics for trucks was the uncertainty as to punctures. Constant experimenting is in progress by tire companies, he said, seeking to learn just what the economical practice in this respect should be.

In connection with the discussion of dead weight on tires, as against weight hung on springs, it came out from R. M. Lloyd that one pound on the dead axle is equivalent in tire burden to four pounds on the truck above the springs.

Selling Without Tires.

The suggestion was made by Charles E. Stone that trucks could be practically sold without tires and the purchasers encouraged to select the shoes with the advice of the representatives of tire manufacturers. This manner of selling has been very generally adopted in Europe and has been favored by the buyers, who can secure precisely what they desire for tires and have whatever equipment will best serve their requirements, for working conditions will vary greatly.

Apropos to the discussion, though not occasioned by it, Arthur J. Slade, consulting engineer, read a decidedly interesting paper on the influence of vehicle design on tire economy, maintaining that many factors in tire wear ought to be considered by the buyer who is seeking a machine, that the choice of that which will yield the largest measure of economy shall be made.

Prior to the meeting the statement was made by the officers that the incorporation of the club had been accomplished, that the working committees had been organized, that resources were larger than ever before, and that the 19 members admitted during the month had increased the membership to nearly 300. The

club has engaged as permanent counsel Ernest K. Coulter, whose advice may be obtained by members on all subjects with reference to their rights with motor vehicles.

DEERY LEATHER TIRES.

A leather tire specially suited to use of motor wagons and trucks has been patented by D. H. Deery of Bridgeport, Conn., which is claimed by the maker to have unusual qualities for endurance. The tires are made to fit any size of standard wheel rim and an average shoe is made of about 600 sections of chrome tanned leather pressed by hydraulic pressure of 5000 pounds to the square inch, which effectually consolidates it. The tire is retained in its form by a pair of half-inch steel rods that in turn are bolted to the rim.

The inventor claims that his tire is nearly as resilient as a solid rubber shoe and that it will yield about five times the mileage that will rubber. The leather is chemically treated and will resist water, while it is not susceptible to the usual influences that make for the deterioration of rubber. The maker maintains that the tires will give from 15,000 to 25,000 miles, according to the conditions in which they are worked, and that, being cheaper than rubber, they are decidedly more economical.

FOREIGN TRADE OPPORTUNITIES.

The consular report on foreign trade opportunities, issued by the Bureau of Foreign and Domestic Commerce, Washington, D. C., makes public the fact that at Madrid, Spain, there is to be public competition for furnishing three automobile chassis, the cost of each of which is not to exceed \$2700, for use by the fire department for carrying life saving and fire extinguishing apparatus; that in the United Kingdom a firm of engineers has requested information that will open correspondence with American firms manufacturing light, single-cylinder, two-stroke engines suitable for use in small parcel cars. Those desiring to do so can correspond with the office of the bureau, addressing No. 12,357 for the first opportunity, and 12,369 for the second.

The Maccarr Truck Company has been incorporated at Scranton, Penn., by C. H. Genter, E. S. Williams, F. L. Belin, J. J. Jermyn, R. G. Jermyn, R. E. Weeks, A. B. Warner and E. H. Connell. The authorized capital is \$125,000.

A department has been established by the Balknap Wagon Works, Grand Rapids, Mich., for the manufacture of motor wagon and truck bodies to manufacturers' or owners' specifications.

J. W. Dietrich has resigned the position of chief engineer for the Universal Motor Truck Company, Detroit, Mich. He has not announced his future plans.

NEW DEPARTURE PROGRESSIONS.

Administration Building Near Completion an Ideal Manufacturing Structure.

Within a few days the New Departure Manufacturing Company, Bristol, Conn., will occupy an administration building that is an ideal manufacturing structure. Erection was begun nearly a year ago. The building is six stories, including the basement, 220 feet length and 62 feet width, and is absolutely fireproof. The wall material is brick and tile and the main entrance is into a vestibule and a lobby that are admirable examples of architectural art.

The first floor of the building is given over to shipping and receiving, the second, third and fourth floors to assembling, and the fifth to offices, these being reached from the lobby by an electric elevator. At the front and south sides of the fifth floor are the private offices of the officials, these being divided by panels of mahogany carrying partitions of plate glass. At the west side is a double fire and burglar proof vault of two stories. The vault equipment is steel. Over the office is a leaded glass dome ceiling light 116 feet length and 16 feet width. There is a large foremen's conference room and a small kitchen on this floor. All office furnishings are mahogany.

The company will this year enter its second quarter-century. When first organized its business was transacted in a room less than 60 feet square; today its plant occupies nearly 60 acres, several millions are invested in machinery, operated by 2000 skilled mechanics, busy day and night much of the time. It is one of the most thoroughly equipped concerns in America. It has every facility for the scientific study of metals and the development of manufacturing processes.

Beginning Jan. 1, changes were effected in the company's organization which will further develop the plant's possibilities. Albert F. Rockwell, one of the founders, whose genius has developed the patents covering the company's products, has been relieved of much of the managerial details, but continues as president. DeWitt Page, who has been identified with

the company almost from its inception, and who has served in later years as secretary, sales manager, purchasing agent and advertising manager, has been appointed general manager. He is well known to the trade and is specially qualified for his duties. Charles T. Treadway, for a number of years treasurer of the company, continues in that capacity, with the added duties of chairman of the board of directors, and he will be an important factor in the future development of this remarkably successful enterprise.

S. A. E. MEMBERSHIP COMMITTEE.

The following membership committee has been appointed by the governing committee of the Metropolitan section of the Society of Automobile Engineers: Chairman, M. R. Machol; L. G. Busby, John R. Cantley, C. W. Flechter, Henry Van Riper Sheel, H. W. Slauson, J. E. Schipper, W. J. Sommers, E. R. Waterman, R. B. Whitman, A. M. Wolf and F. C. Wulf. This committee is making a campaign for membership and expects to increase the section considerably during the coming year.

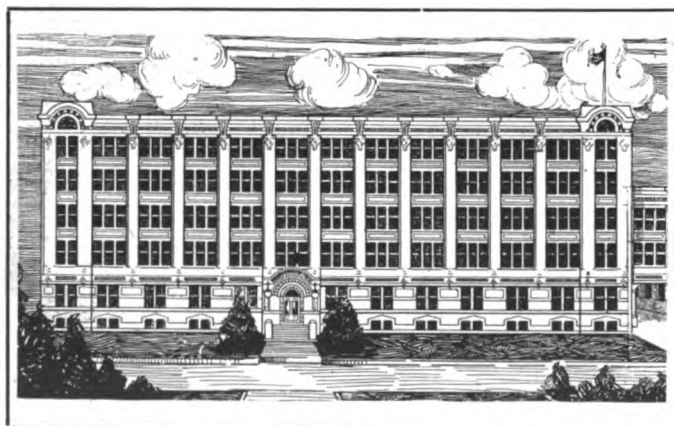
WAVERLEY COMPANY'S OFFICERS.

The stockholders of the Waverley Company, Indianapolis, Ind., have elected the following officers: President, William B. Cooley; vice president, Herbert H. Rice; secretary, Wilbur C. Johnson; treasurer, William Kothe; directors, Hugh Daugherty, Joseph C. Schaf, Alexander C. Ayers and Hugh M. Love. The gross business for the fiscal year was \$1,312,815. The capital of the company is \$190,000, and including this and the surplus and undivided profits the company has resources of approximately \$590,000.

The Wasatch Motor Manufacturing Company has been organized at Salt Lake City, Utah, with capital of \$100,000, and a site of 10 acres has been purchased on which a four-acre plant is to be built. The intention of the company is to build trucks, but later on pleasure cars may be produced. The chief engineer and superintendent is George T. Smith, formerly general manager of the New York Mail Company. The officers of the company are: President, A. E. Young; vice presidents, John A. Maxfield and C. M. Fallas; secretary, J. B. Hamby; treasurer, R. E. Montrose.

Licenses to manufacture spark plugs under the Canfield patent have been granted by A. R. Mosler & Co., Mount Vernon, N. Y., to the Randall-Faichney Company, Boston, Mass.; Hampshire Manufacturing Company, Hatfield, Mass., and McCormick Manufacturing Company, Dayton, O.

The capital of Morgan & Wright, one of the subsidiary concerns of the United States Tire Company, has been increased from \$2,500,000 to \$5,000,000.



The Administration Building Shortly to Be Occupied by the New Departure Manufacturing Company, Bristol, Conn.

TO IMPROVE STREET TRAFFIC.

The Citizens' Street Traffic Committee has been organized as the result of a meeting of those interested in the improvement of street traffic conditions in New York City, which is to place information it may obtain at the disposal of the city authorities with a view to bringing about better regulation of highway use. The meeting took place at the house of the Automobile Club of America and was presided over by Robert Grier Cooke, president of the Fifth Avenue Association, which operates a line of motor omnibuses in Fifth avenue. The secretary was Elmer Thomson, secretary of the Automobile Club of America. In this movement the assistance of the Motor Truck Club of America was assured by President George H. Duck, and Harvey Robinson, secretary of the Electric Vehicle Association, offered the co-operation of that body. A deputy commissioner is to have supervision of the active work of the committee, and he will be assisted by a representative from each of the five boroughs of the city.

ELECTRIC VEHICLE BUREAU.

The United Electric Light & Power Company, New York City, has established an electric vehicle bureau, under the management of David F. Tobias, for the purpose of furthering the sale and use of electric vehicles in New York City and vicinity. It is the purpose of the bureau to co-operate with companies distributing vehicles and vehicle accessories, as well as with garages and owners of machines. The bureau is collecting transportation and operating data and purposes to interest the owners and users of horse equipment in "doing it electrically". The service of the bureau is available at all times to those in need of information, and may be obtained by addressing the manager at 1170 Broadway, New York City.

MOTOR WAGON PAPER DISTRIBUTION.

The Tampa, Fla., Tribune is a morning publication, and until recently its distribution, because of peculiar conditions, noticeably the absence of trains early in the day, was a problem that had never been satisfactorily met. There are a number of towns on the West Coast in which the paper could be circulated if delivered at a reasonable hour, but transportation was lacking until the paper purchased a Commerce wagon and used this for delivery of dealers' orders. Besides placing the paper in the different communities in season to develop material patronage, the cost of distribution has been considerably lessened.

Vibert S. Ross is manager of production of the Drednot Motor Trucks, Ltd., a Montreal, P. Q., company that has been reorganized and will continue the manufacture of Drednot trucks at 143 Welling street, in that city.

TIRE GUARANTEES REDUCED.**Five Makers of Truck Equipment Decrease Mileage Assured to Users.**

During the period between Jan. 2 and 9, five of the leading companies manufacturing solid tires for motor wagons and trucks announced a reduction of mileage guaranteed on all specified types sold following the announcements, with the understanding that adjustments would be made on all tires sold previous to the dates stated on the mileage guarantees in effect when purchases were made. That is, the reduction of guarantee would not be retroactive.

The companies acted independently, but the basis is now practically 7000 miles for a tire for a gasoline motor vehicle, to be used within a year, and 8000 miles for a tire for an electric vehicle, to be used within 18 months. The reduction does not affect all of the types made by some of the companies, for in a number of instances the guarantees were not uniform.

The Goodyear Tire & Rubber Company's reduction from 10,000 to 7000 miles was on the solid demountable, block, solid metal base and side flange types, these being placed on the basis stated, but no change was made in the guarantee on the hard rubber base type guaranteed for 5000 miles, on the solid clincher guaranteed for 7000 miles and the demountable cushion guaranteed for 7000 miles.

The B. F. Goodrich Company reduced the guarantee from 10,000 to 7000 miles on all gasoline vehicle tires, the guarantee to continue 12 months from date of sale, and on all electric vehicle tires from 10,000 to 8000 miles, the guarantee to continue for 18 months.

The Firestone Tire & Rubber Company reduced its guarantee from 8000 to 7000 miles on all solid tires for gasoline vehicles, to be used within a year, and placed the guarantee on electric vehicle tires at 8000 miles to be used within 18 months.

The United States Tire Company reduced its guarantee from 10,000 to 7000 miles on all gasoline vehicle tires, with a limit of 12 months for use, and on electric vehicles from 10,000 to 8000, with a limit of 18 months.

The Kelly-Springfield Tire Company reduced its guarantee of 10,000 miles for gasoline vehicles to 7000, with a year as the period of use, and on electric vehicle tires from 10,000 to 8000 miles, to continue for 18 months.

The reason for the reduction is stated to be the inability of the companies to continue guaranteeing mileage as formerly, and the belief that the owners will be impelled to bring about such changes in operation as will minimize tire wear.

The Midwout Motor Truck Manufacturing Company has been organized at Easton, Penn., with capital of \$500,000 to build vehicles, engines, etc., by J. C. Potts of Easton and P. L. Garrett and E. C. Boyd of Wilmington, Del.

URBAN ELECTRIC TRACTOR.

Machine with Three Tons Haulage Capacity Built by Kentucky Wagon Co.

In addition to its types of electric service wagons and trucks, the Kentucky Wagon Company, Louisville, Ky., has begun the production of a tractor that has a haulage capacity of three tons, which is intended for use in lumber yards or where animals have been utilized for placing of loads for convenient handling. It may be used practically for a number of purposes. The tractor is short, to facilitate easy operation in limited space, and at the rear is an extension on which the front end of a load carried on a two-wheeled reach is supported. The wheelbase of the tractor is 58.25 inches, but the overall length is 154.75 inches, and the tread 57 inches and the overall width 71 inches. As constructed the tractor carries the battery on top of the chassis frame, the forward end of the box supporting the seat for the driver.

The design of the machine is conventional. The motor is a General Electric type 1022, rated at 85 volts, 40 amperes, and 1200 revolutions a minute, which is installed transversely in the pressed steel frame just back of the rear axle, the motor being enclosed in a water and dust tight steel frame. The power from the motor is transmitted from the sprocket end of the armature shaft by a Morse silent chain to a sprocket incorporated with the differential assembly of the jackshaft, the chain and differential being enclosed, the chain running in an oil bath. The jackshaft is mounted on ball bearings and the drive is by side chains to sprockets on the rear wheels.

The controller is a continuous torque type and is installed in a case in front of the driver, and it affords four speed ratios forward and two in reverse. The frame is carried on semi-elliptic springs that are fitted with bronze eye bushings and the shackle bolts are hardened and fitted for grease cups. The axles are I section forward and rectangular section rear, the spindles being large, and the wheels are 32 inches diameter, equipped with Timken bearings. The tires are solid, four inches width.

The tractor steering gear is semi-reversible, a worm and nut type, the bearings being made large to insure against wear. The brake, operating on the rear wheels, is actuated by a pedal. The battery is 44 17-plate Hycap-Exide M V cells, which is sufficient to drive the machine through 10 hours' service. The speed is fixed at 12 miles an hour light and nine miles an hour drawing a three-ton load. The weight is approximately 4500 pounds. The machine can be turned in a radius of 15.5 feet. The platform on which the end of the load is carried is mounted on a pivot on the frame extension and the tractor can be driven so that the load when carried on two wheels can be turned practically in its own length. A rope carried through a sheave mounted under the end of the extension is

fitted with a hook at the end that can be hooked into the binding chain of a load of lumber, and this serves to tow the load. Release of the rope will permit the tractor to be driven free, so that the forward end of the load may be dropped or raised.

GOODYEAR CAPITAL INCREASE.

The stockholders of the Goodyear Tire & Rubber Company, Akron, O., will at a meeting March 3 act on a proposal to increase the preferred stock from \$5,000,000 to \$7,000,000, and common stock from \$5,038,000 to \$8,000,000. The proposition is that common stock to the value of \$1,500,000 be sold to holders of common stock, that \$2,000,000 preferred stock and \$500,000 common stock be sold to holders of preferred stock, both sales to be at par, and that the \$4,000,000 realized from the sales be utilized as new capital. The plan comprehends a common stock dividend of 20 per cent.

EXPERIMENTAL ROAD MAKING.

During 1913 more than 480,000 square yards of roads of different surfacings were constructed under the supervision of the office of public roads of the United States Department of Agriculture. The construction was in Arkansas, Florida, Georgia, Kentucky, Maryland, Mississippi, Nebraska, North Carolina, South Dakota, Tennessee, Texas, Virginia and Wisconsin and the District of Columbia. Since 1905 the office has supervised the construction of more than 4,000,000 square yards of road surface in nearly every state in the nation.

ADAMS BROS. COMPANY ELECTS.

The officers of the Adams Bros. Company, Findlay, O., chosen by the stockholders to serve the current year, are the following: President, Joseph J. Kwis; vice president, C. H. Bigelow; secretary, L. J. Adams; treasurer, B. B. Bigelow; purchasing agent, D. B. Adams; sales manager, J. T. Adams; general manager, W. D. McCaughey.

A three-ton KisselKar truck in the service of the C. G. Hartin Coal Company, St. Paul, Minn., fitted with a patent hydraulic body hoist, in one day, between 7 in the morning and 6:40 at night, delivered 79 tons and 1900 pounds of coal, this representing more than 26 capacity loads.

At a meeting of the Electric Motor Car Club of Boston, held at the Hotel Thorndike, that city, the evening of Jan. 27, the members listened to a statement of the plans for the Boston automobile pleasure car and motor truck shows, made by George D. Berry, assistant to Manager Chester I. Campbell.

SPARK PLUG MAKERS ORGANIZE.

The Association of Spark Plug Manufacturers was formed at Chicago, Ill., Jan. 29, this being the outcome of a preliminary meeting held at New York, the membership at that time consisting of 17 of the 35 firms manufacturing under Canfield patent licenses. A constitution was adopted and J. W. Fisher of the Silve Company was elected secretary and A. R. Mosler treasurer. A committee, consisting of R. E. Mills of the Rajah Company, R. A. Stranahan of the Champion Spark Plug Company, Albert Champion of the Champion Ignition Company, Emil Grossman of the Emil Grossman Manufacturing Company and E. M. Benford of the Benford Manufacturing Company, was named to investigate all matters relating to the spark plug industry, to report all infringements of the Canfield patent, and to consider and make report on all conditions that will be prejudicial to the interests of the industry as a whole or those using its products. Mr. Benford is chairman of the committee. Membership in the association is confined to individuals, firms or corporations engaged in manufacturing spark plugs or parts. The annual dues are \$25. The formality necessary for membership is signing the constitution and payment of dues. The office of the association will be located in New York.

BIG TIRES PREVENT SKIDDING.

The Indianapolis fire department has motorized apparatus in use which is utilized as in all other city departments, making as quick response to alarms as is practical with safety to highway traffic and the equipment. While making runs skidding on wet or slippery paving or street surfacings and when making turns was found to be a material source of danger. Different fitments were utilized with hope of minimizing skidding, and after experiment with chains and other devices to improve traction, increase of tire sizes was decided on. Accordingly a heavy ladder truck was equipped with pneumatic shoes 38 by eight inches, which were of the "Nobby Tread" type, and made by the United States Tire Company. These have been in use a sufficient length of time to justify an opinion as to their efficiency, and the statement is made by the driver of the truck that this equipment has practically eliminated skidding and the consequent danger. That the other motor apparatus of the department will be similarly tired is probable.

An example of the earning power of a motor truck when worked to full capacity is furnished by the records of the Cleveland Macadam Company, which show that its five-ton White dump truck, made by the White Company, Cleveland, O., used for hauling crushed stone, earned \$500 a month during a period of 4.5 months when it was possible to keep it moving all the time. The machine was loaded by a chute and dumped by the power of the engine.

ELECTRIC MEN INVADE SALEM.**New England Section, E. V. A. Promotes Interest in Haulage Subjects.**

The January meeting of the New England section, Electric Vehicle Association of America, the first of a series which will be held in cities in different parts of the states the organization represents, was at Salem, Mass., Jan. 15, the members giving over a considerable part of the day in a concerted effort to promote interest in the use of electric machines for both passenger and freight service. The section has inaugurated a policy which is expected to be productive of good results and to interest men generally engaged in business in the possibilities for economy in highway transportation. The purpose is to demonstrate the practical uses that can be made of electric vehicles, and to stimulate the local central stations to activities that will be productive of business.

A parade of a considerable number of pleasure cars, wagons and trucks was made in the afternoon through the principal streets of Salem, Beverly and the towns of Peabody and Danvers, and at 6 there was a dinner at the Salem Club. At 7:30 a parade of illuminated electric vehicles was made in the business section of Salem, and at 8 a meeting was held at the rooms of the Salem Board of Trade that was well attended. The visitors were welcomed by Mayor Hurley, and his remarks were replied to by Day Baker, treasurer of the Electric Vehicle Association.

Harry F. Thomson, engaged in research work for the electrical engineering department of the Massachusetts Institute of Technology, spoke to considerable length on the "Practicality of the Electric Vehicle", his address being illustrated by lantern slides. He sought to impress upon the audience that the electric car or wagon was in every way reliable, enduring and economical, and was suited to every purpose within its radius of movement. He was followed by Col. E. W. M. Bailey of Amesbury, by Frank J. Stone of the Electric Storage Battery Company, and by George W. Holden of the Edison Storage Battery Company. The chairman of the meeting was J. A. Hunnewell, chairman of the New England section.

The annual meeting of the B. F. Goodrich Company, which was to take place Jan. 21, because of the necessity of a full audit of the books, which could not be completed at that date, has been advanced to the third Wednesday in March.

The Union Ice Company, San Francisco, Cal., is now using 26 Packard trucks for haulage and distribution, having recently received 13 new machines.

The New Haven, Conn., Dairy Company has ordered two three-ton Universal worm driven trucks for immediate delivery.

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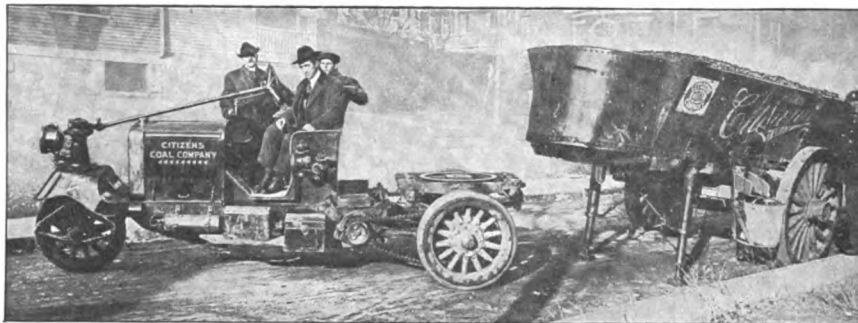
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VOL. V.

PAWTUCKET, R. I., MARCH, 1914

No. 3

BOSTON'S THIRD NATIONAL MOTOR TRUCK SHOW.

Exhibition That Will Be Opened at Mechanics' Hall, March 17, Will Include 125 Different Types of Service Vehicles Produced by 35 Makers, Most of Them Fitted with the Latest Developments in Labor-Saving Body Equipment.

WHAT will be the only national exhibition of motor wagons and trucks of the year will be opened at Mechanics' building, Huntington avenue, Boston, at 8, the evening of March 17, and will be concluded the night of March 21, and it will be the third successive exclusive show of this character organized by the Boston Commercial Motor Vehicle Association, under the personal supervision of Chester I. Campbell. Extremely careful preparations have been made for the show and it will undoubtedly be the largest and best ever held in New England, and, for that matter, in America.

The present show was determined before the conclusion of the exhibition of 1913, and the preparations have been in progress for the past year. The announcement was made despite the abandonment by the National

Automobile Chamber of Commerce of the New York and Chicago truck shows, and the reason that impelled the decision was accurate knowledge of the business conditions obtaining in New England. There is no market in the world more promising than are the six New England states, which are a veritable hive of industry, and the need of highway transportation is absolutely imperative because of economic requirements.

The show was planned for a time when it would be possible for the business man from out of the city to combine a visit to it in connection with buying or other occasions for visiting Boston. Many of the smaller commercial centres have comparatively few agents or representatives of manufacturers, and a part of a day spent at the show will afford opportunity for obtaining information of all exhibits. From the viewpoint of economy of time of the Boston resident this is

a material factor, but when this is weighed by the visitor it is of even greater importance.

The show will attract many New Englanders from the fact that Boston can be reached from any point in a few hours. It will take place at the beginning of the period of the year when business activity is greatest, and when equipment must be



Mechanics' Building, Huntington Avenue, Boston, Where the Third National Motor Truck Show Will Take Place.

purchased. One of the features of the exhibition will be the attention that has been directed toward body production, for besides the standards stocked or furnished as regular equipment, there will be seen a very large diversity of special constructions intended to serve when quick loading and unloading is necessary to develop practical economy. There will be, in addition to these features, the differing improvements that have been made, generally as refinements and perfec-

tions of models that have been adopted as standard.

The number of different makes of machines that will be exhibited, so far as can be determined at this writing, will be 35, which will be shown by 31 different exhibitors, and the total of the vehicles included in these exhibits will approximate 120. This will be a much larger show than has ever been made exclusively of wagons and trucks, and the number shown by each exhibitor will range from one to 12. There is, however, probability that the aggregate will be somewhat increased before the show is opened to the public.

Going over the list of exhibitors it will be noted that with rare exception the displays are made by the agents or manufacturers' branches, and with but four exceptions all of the machines are those recognized as standards of the market. As a matter of fact but three are really new, one of the four being the product of a concern that has been reorganized and is to continue the production of the machines made by its predecessor.

Of the 35 different makes, 30 will be gasoline vehicle, four electrics and one steam, and of these five have never before been seen in Boston. Of the five, one is an electric and the others are gasoline. The new electric vehicle is the Andover, built by the Andover Motor Vehicle Company, Andover, Mass., and will be seen in 1000 and 2000-pound capacities. These machines are worm and gear driven and have been carefully designed and developed. One of the gasoline machines is the Walter five-ton truck, which is built under the Latil patents by the Walter Motor Truck Company, New York City, and is driven by the front wheels with metal tired rear wheels. This will be the first time this machine has been exhibited. Another new comer will be the Palmer-Moore 1600-pound delivery wagons, built by the Palmer-Moore Company, Syracuse, N. Y., and the others are the Twombly light wagon, built by the Twombly Car Corporation of Avondale, N. J., and the La Vigne light wagon, built by the La Vigne Cyclecar Company, Detroit, Mich. The Parcel Post Equipment Company, Grand Rapids, Mich., is successor to the Grand Rapids Motor Truck Company.

The display of accessories, equipment and supplies will be in keeping with the character of the show and will greatly interest all service vehicle owners.

The list of vehicle exhibitors is the following:

Andover—Andover Motor Vehicle Company, Andover, Mass.; one 1000 and one 2000-pound Andover electric wagon. Space 29.
Attisbury—Mattapan Motor Car Company, Mattapan, Mass.; one 1500-pound delivery wagon, one 1.5-ton worm drive truck, one three-ton truck. Space 113.
Autocar—Autocar Sales & Service Company, 642 Beacon street, Boston; one stripped chassis, four chassis with service bodies, one 15-passenger hotel bus. Spaces 115, 116 and 117.
Chase—Chase Motor Truck Company, Syracuse, N. Y.; one model D wagon, one model K wagon, one model R chassis and

one model O chassis. Spaces 26, 27 and 28.

Buick—Buick Motor Company, 95-99 Massachusetts avenue, Boston; one stripped chassis, four chassis fitted with service bodies. Space 5.

Couple-Gear—W. E. Eldredge, 221 Columbus avenue, Boston. Space 30.

Eldredge—W. E. Eldredge, 221 Columbus avenue, Boston. Space 30.

Federal—Whitten-Gilmore Company, 620 Commonwealth avenue, Boston; one model H stripped chassis, four model H chassis fitted with service bodies. Space 108.

Garford—R. & L. Company, 915 Boylston street, Boston; one two-ton truck, one three-ton truck, one six-ton truck. Space 110.

GMC—General Motors Truck Company, 753 Boylston street, Boston; one model VC 1.5-ton truck, one model SC two-ton truck, one model HU 3.5-ton truck, one model KU six-ton truck; all gasoline motor driven. Spaces 13 and 18.

GMC—General Motors Truck Company, 753 Boylston street, Boston; one 2000-pound electric truck chassis and one 12,000-pound electric truck chassis. Spaces 13 and 18.

Packard—Packard Motor Car Company of Boston, 1089 Commonwealth avenue, Boston; one two-ton chassis, one three-ton chassis, one four-ton chassis, one five-ton chassis, one six-ton chassis. Space 1.

Parcel Post—Parcel Post Equipment Company, 20 Green street, Cambridge, Mass.; Parcel Post wagons. Space 31.

Pierce-Arrow—J. W. Maguire Company, 745 Boylston street, Boston; one five-ton chassis, three five-ton trucks with service bodies, one two-ton chassis, two two-ton trucks with service bodies. Spaces 15, 16, 19 and 20.

Willlys Utility—R. & L. Company, 915 Boylston street, Boston; Willys Utility 1500-pound wagons. Space 111.

IHC—International Harvester Company of America, 43 Somerville avenue, Somerville, Mass.; water and air-cooled delivery wagons. Spaces 105 and 106.

Jeffery—C. P. Rockwell, Inc., 640 Commonwealth avenue, Boston; one 1500-pound wagon and one 2000-pound wagon. Space 107.

Kelly—Kelly-Springfield Motor Truck Company, 43 Somerville avenue, Somerville, Mass.; one Kelly one-ton truck, one Kelly two-ton truck, one Kelly 3.5-ton truck, one Kelly five-ton truck. Spaces 102 and 103.

Knox—Knox Automobile Company, 885 Boylston street, Boston; model S combination chemical, hose and fire pump; model M-3 combination hose and chemical wagon, model 31 Knox-Martin tractor, model 32 Knox-Martin tractor, model 31 Knox-Martin tractor adapted for fire department purposes. Spaces 8 and 12.

Lauth-Juergens—Myer Abrams Company, 159 Vassar street, Cambridge, Mass.; one one-ton truck, one two-ton truck, one three-ton truck and one five-ton truck. Spaces 131, 132 and 133.

La Vigne—C. J. Fischer Company, 222 Massachusetts avenue, Cambridge, Mass.; La Vigne light delivery wagon. Spaces 129 and 130.

Little Giant—Little Giant Truck Company of Boston, 221 Columbus avenue, Boston; 2000-pound delivery wagons. Space 30.

Locomobile—Locomobile Company of America, 700 Commonwealth avenue, Boston; one five-ton chassis, one five-ton chassis with demountable dumping body and one five-ton chassis with McGarry roller platform body. Spaces 13 and 17.

Palmer-Moore—Palmer-Moore Company, Syracuse, N. Y.; Palmer-Moore 1600-pound water and air-cooled motor wagons. Space 144.

Republic—Alma Motor Truck Company, Alma, Mich.; two one-ton Republic wagons. Space 36.

Reo—Linacott Motor Company, 163 Columbus avenue, Boston; one model H truck, one model J truck and one one-ton truck. Spaces 119 and 120.

Selden—Baker Motor Sales Company, 400 Massachusetts avenue, Boston; one model J truck, one model JL truck. Space 9.

Stewart—H. Ross Maddocks Company, Inc., 175 Pleasant street, Boston; one chassis, one model A truck, one model B truck, one model F truck. Spaces 24 and 25.

Standard—Whitten-Gilmore Company, 620 Commonwealth avenue, Boston; two three-ton trucks. Space 109.

Stanley—Stanley Motor Carriage Company, Newton, Mass.; one model 607 delivery wagon, one model 713 delivery wagon, one model 812 express wagon and one 12-passenger mountain wagon. Spaces 21 and 22.

Twombly—Twombly Car Corporation, Avondale, N. J.; Twombly light delivery wagons. Spaces 24 and 25.

Universal—W. F. Magill, 58-60 Brookline avenue, Boston; one model C chassis, one model A truck, one model K truck. Space 122.

Velle—Velle Motor Vehicle Company, 16 Amherst street, Cambridge, Mass.; one one-ton truck, one two-ton truck, one three-ton truck. Space 112.

Walter—Walter Motor Truck Company, New York City; one Walter five-ton front-wheel drive chassis. Space 138.

White—White Company, 930 Commonwealth avenue, Boston; four 1500-pound wagons, two 3000-pound wagons, two three-ton trucks, two five-ton trucks, one patrol wagon. Spaces 3, 4, 6, 7, 10 and 11.



Chester I. Campbell, General Manager, Boston Motor Truck Show.

REEVES IS GENERAL MANAGER.

Alfred Reeves, who was general manager of the American Motor Car Manufacturers' Association, and of the Association of Licensed Automobile Manufacturers, later sales manager of the United States Motors Company and general manager of the Hartford Suspension Company, was elected general manager of the National Automobile Chamber of Commerce March 5, succeeding Samuel A. Miles, who will devote all his time in future to the organization of the New York and Chicago automobile shows.

Mr. Reeves has had long experience with the office that he has resumed after an absence of several years, and he is one of the best known men in the industry. His knowledge and ability will no doubt add to the activities of the organization he is associated with, and the interests of the members will receive careful and prompt attention. Mr. Miles has managed the shows of 1913 and 1914 in New York, and he has directed all the shows in Chicago since 1902. Prior to that time he was interested in bicycle exhibitions. Under Mr. Miles' management the New York and Chicago shows have been exceedingly productive and profitable.

PEERLESS FIRE APPARATUS.

The Peerless Motor Car Company, Cleveland, O., has begun the manufacture of chassis adapted for equipment with fire department apparatus, and has designed a chassis with which horse engines may be converted to motor driven at comparatively small expense. Several of these vehicles are now in regular service and are stated to give excellent satisfaction.

NEW SERVICE MOTOR TRUCKS.

Three new models will be produced the present year by the Service Motor Car Company, Wabash, Ind., these being a different type than any previously built by this concern. The transmission of power in Service vehicles until these machines were produced was by the friction disc and wheel, so-called, but with these two driven wheels are utilized instead of the single wheel, which is the usual form.

The new models are of 3000, 4000 and 6000 pounds capacity, these being to very conventional designs and are fitted with Buda motors, Timken axles, Ross steering gears and a Warner gearset for the 3000-pound type and Timken gearsets for the two largest sizes. The drive of these machines is by double side chains.

HAULAGE BY SLED TRACTOR.**Novel Equipment Used by Knox Automobile Company in Snow-Filled Streets.**

With animals a snow fall of six inches is sufficient to materially impede traffic and loads must be reduced a third to a half, to say nothing of the greater time required for travel. With motor vehicles the machines can be driven in snow so long as the driving wheels can obtain traction, and the four-wheel driven truck will work more satisfactorily in deep snow than that driven by two wheels, the reason being evident enough. With heavy machines the rolling wheels will "climb" the snow and pack it beneath the tires, but the traction wheels, which are usually equipped with chains, cut through until a solid surface is reached.

During the heavy storms the last 10 days in February snow fell until it was 30 inches deep at Springfield, Mass., and practically every street in the city that was not kept open by the street railroad snow plows was obstructed for varying periods. In these roadways were broken eventually, but until this was done the use of nearly every form of vehicle was more or less impossible. Horses were used only with plows, and when the snow accumulated under the power wagons and they were in a sense converted into sleds, the bodies packing the snow beneath them and preventing the traction wheels reaching the ground, they, too, were unable to make progress.

The Knox Automobile Company used a Knox-Martin tractor in haulage practically all the time, during and following the storm, which was literally converted into a snow-tractor. Large shoes shod with steel and shaped to be clamped to the steering wheel of the tractor and the rear wheels of the trailer body were made and attached, and the driving wheels of the tractor were equipped with chains. Thus adapted the tractor was sent out into the deepest snow and good progress was made with capacity loads. The machine was easily controlled and traction was at all times sufficient, no matter what depth of snow it was in.



Knox-Martin Tractor, with Runners Attached to the Free Wheels, as Used by the Knox Automobile Company at Springfield, Mass., in Extremely Deep Snow.

HEXTER GASOLINE-ELECTRIC TRUCKS.

THE Hexter wagons and trucks, which were designed by Percy K. Hexter and are built by the Roland Gas-Electric Corporation, New York City, a concern that has been building machines commercially since last autumn, are, as the title of the company would imply, of the gasoline-electric type, the power being generated by gasoline motors and electric generators, and applied by electric motors, through jackshafts and side chains in the two larger sizes, and by shaft and worm and gear in the two smaller models. The purpose of the designer in using this method of power transmission is to obtain the highest degree of flexibility and to utilize the exact power necessary to drive the machines, rather than to adhere to the conventional gasoline motor driven vehicle with a limited number of speed ratios.

The Hexter designs are not experiments. The first machines produced were worked in every condition that could be found that would test their endurance and operating qualities. In every instance the results were gratifying and the company was organized for producing the trucks after a thorough demonstration of their qualities. The machines are constructed with the view of affording long endurance in the hardest service. The material is the best that can be procured and the workmanship is high class. The construction is with ample margins of safety, and with the minimized stresses when worked to capacity, because of the character of propulsion, the machines are expected to have unusually long life.

All Vehicles Have Same Characteristics.

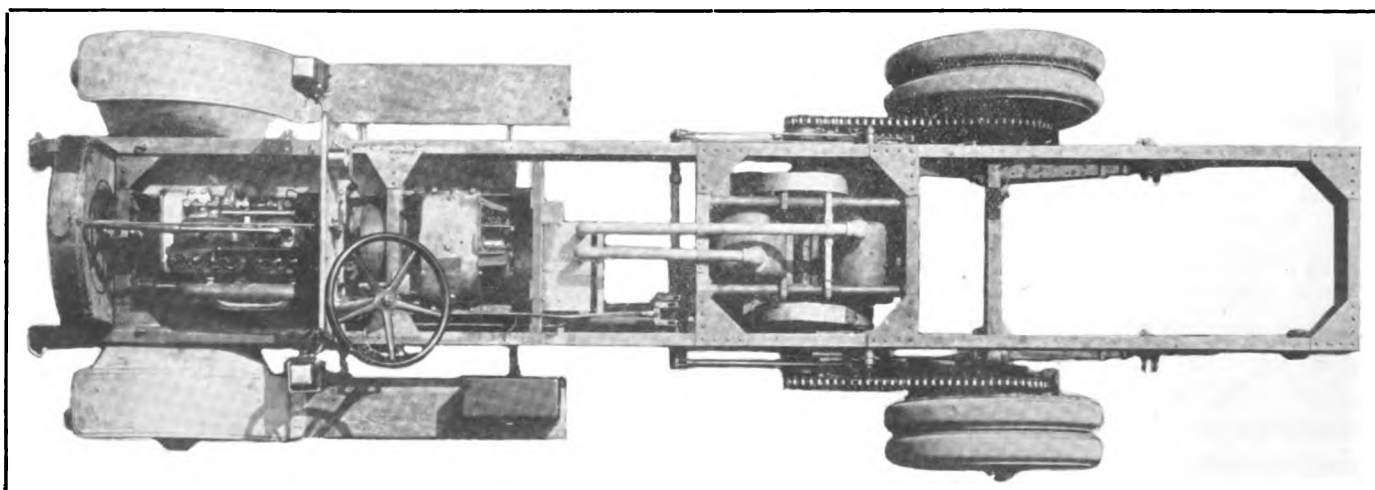
The 1.5 and the 3.5-ton machines are identical in design, as are the five and seven-ton trucks, differing only in proportions of components. There are characteristics that obtain with all sizes, such as the use of a carburetor that is not adjustable, the use of ignition systems that eliminate hand control, the governing of all motors to specific maximum speeds, and the simplifying of the controlling system. In all these machines no clutch is used. The gasoline motor is coupled

to the electric generator, and this is driven to whatever speed is necessary to obtain a desired maximum power output from an electric motor.

This generator is built by the General Electric Company and is designed to have high efficiency and long endurance. It is a standard type of construction and has been abundantly tested in continued service. It is compound wound and designed to maintain a voltage as nearly uniform as is practical, so that increasing the speed of the gasoline engine does not, as might be expected with the ordinary dynamo, greatly add to the voltage, but the amperage is increased and the electric motor is supplied with a greater volume of current. That is to say, the potential is maintained within a specified range, but the amperage is widely variable, and this insures a sufficiency of power whenever it is necessary without exceeding the safe limit. The governing of the gasoline motor insures against excessive speed and protects the electric motor. At low engine speeds there is sufficient power generated to operate the vehicle wherever service may require. Like all well built electric motors, those used in Hexter machines are designed so they will endure under a very large overload for a brief period, and when occasion arises ample power is always available.

Change from Chain to Worm Drive.

The original Hexter truck was of 3.5 tons capacity, and this design is continued as the five and seven-ton types, and the most recent creation is the design of the 1.5 and 3.5-ton machines. The power plant and electric generator installation is the same in all, but a single motor is used in the two smaller vehicles. This motor is suspended in a sub-frame that carries the gasoline engine and generator, and the driving end of the armature shaft is coupled to the main shaft by a universal joint. The driving shaft extends to and drives the worm shaft and gear wheel mounted in the rear axle housing. The rear axle is a full floating type, the housing carrying the load, the driving shafts affording the traction only. With both of these ma-



Top View of the Hexter Gasoline-Electric Seven-Ton Truck, Showing the Location of the Generator Driven Motors, Each of Which Drives an Independent Jackshaft.

chines the drive is through the rear springs, which are shackled at the rear ends only.

The engine of the 1.5-ton machine is a Waukesha, with cylinder bore of 3.75 inches and stroke of 5.75 inches, a four-cylinder, water-cooled construction fitted with an automatic float feed carburetor, and an Eisemann single high-tension ignition system with a fixed spark. The fuel supply is controlled by a pedal, the purpose

being to prevent a sufficient volume being furnished the engine to cause it to race when idle, this being a protection for the generator. The generator is 7.5 kilowatt capacity. The 3.5-ton truck has a Waukesha engine of the same type with cylinder bore of 4.25 inches and stroke of 6.75 inches, but it is fitted with an Eisemann dual ignition system with automatic spark advance, and the fuel supply is similarly controlled. The generator is 7.5 kilowatt capacity.

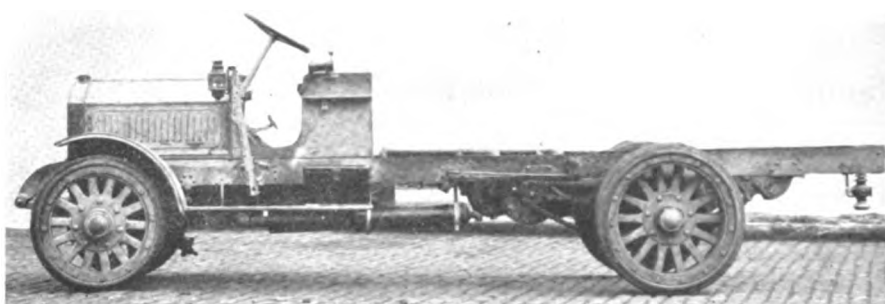
Two Motors for Large Trucks.

The power from the generators of the five and seven-ton trucks is utilized by two motors, which are suspended in main chassis frame, one forward of and the other back of the jackshaft. The forward motor drives the right side of the jackshaft and the rear motor the left side, the jackshaft being in reality two separate shafts that are driven independently of each other. The pinion ends of the motor armature shafts carry sprockets which are aligned with larger sprockets on the driving shafts. Chain cases enclose the silent chains by which the jackshafts are driven, the chains and sprockets operating in oil baths. From the outer ends of the jackshafts, sprockets and chains transmit the power to the rear wheel. There is no differential, as might be inferred, and one motor may be driven as much faster than the other as necessity requires, affording equal traction no matter what the condition. The driving thrust of these machines is taken by radius rods. The power plants are larger and the generators are 12 kilowatt capacity.

As will be noted from the illustrations the design of the chassis is in every way conventional. The radiator is mounted in front of the engine, the gasoline motor is covered by a hood and is easily accessible. The chassis frames are of heavy steel channel section and these are carried on semi-elliptical springs. The axles are large and are fitted with anti-friction bearings throughout. The machines are driven from the left side, and the fuel control is by an accelerator pedal and the electric current is controlled by a hand controller that is exceedingly simple. The service brake is applied by a pedal and the emergency brake by a hand lever, both operating on drums on the rear wheels.

Power Control Exceedingly Simple.

The electric power control is by a controller handle located at the side of the driver's seat, that affords two forward speeds and reverse. The system differs



Side View of the Hexter Seven-Ton Truck, Showing the Conventional Appearance of the Construction.

from that of the battery driven vehicle in that resistance is not used, but the current is varied by use of different motor circuits. When the forward high speed is used the motor or motors are in parallel, and when in low forward speed or reverse they are in series. The speeds forward are not widely varied so far as vehicle movement is concerned, but the low speed affords much greater torque and consequently it is more productive of power in the event of ascending grades or in sand or rough road. The motors are arranged in series-parallel and they will endure the full output of the generator for 20 minutes before they will heat to a danger point. There is a neutral position for the controller handle in which both the motor and generator circuits are broken, and when so set the gasoline engine may be operated without influencing the electric power system. When operated slowly the generator does not generate sufficient current to be effective. Because of this fact the controller lever may be moved from one position to another without causing movement of the machine. Because of regulation by the foot accelerator the gasoline engine can only be operated slowly without its use, but movement of the accelerator will increase the speed to such a point that the truck can be moved with the controller in any of the three positions.

The gasoline engine is started by cranking, and from every aspect its operation is conventional. Its range is from the idling speed to the maximum allowed by the governor. In the low forward speed position the fuel consumption is most economical. The customary method of varying speed when in motion, unless the road is rough or sandy, or ascending a grade, is by change of engine speed.

The Roland Gas-Electric Vehicle Corporation builds chassis only, and the purchasers have body equipment constructed to meet their special requirements. The present capacity of the works is about 100 machines a year.

The Continental Motor Manufacturing Company has added 200 workers to its Muskegon, Mich., plant, which is extremely busy with the production of small types of engines.

C. P. Kiel is endeavoring to interest business men of Oakland, Cal., in a projected company to build a truck in that city.

CONTRACT STORE DELIVERY.

Equipment Having Private Ownership Appearance Provided at Cleveland.

The Delivery Company, Cleveland, O., which is now operating a large fleet of electric wagons and several gasoline trucks for general transportation and distribution in that city and suburbs, specializes in two directions. It will make contract to regularly deliver the goods of any store of any proportions on a basis of packages; it will make deliveries casually whenever orders are received, and it will furnish those who desire to operate themselves any type of vehicle desired, with driver, at a flat rental price for the month.

The company is now serving more than 200 different stores of the city and for a number of firms machines have been provided that have all the appearance of private ownership, being finished with panel bodies bearing the names of the firms using them, and decorations or lettering that have a distinct advertising value. Of course such vehicles are not utilized for any other purposes than those of the firms renting them, and being devoted exclusively to such service they are controlled as though they owned them. In some instances the drivers are uniformed.

When a machine is rented the price includes the service of the vehicle, the driver, attention, care, maintenance, and every detail of operation, the company storing the wagon in its own garage, having all work done by its mechanics, and systematically maintaining and operating it. The possibilities for keeping it in first class condition are much greater than were it cared for incidentally by a garage, or by a man with limited experience, the company's organization being developed with a view of protecting its property fully and giving its customers the best service that is practical. In the event of accident or mishap another vehi-

cle is temporarily supplied, so that there shall be no loss of time or service. The accompanying illustration shows a pair of Baker 1000-pound delivery wagons, with panel bodies, such as are used by the company for delivery or rental purposes.

CANNOT USE NAME "GRAMM".

The suit instituted by the Gramm Motor Company against Fisher & Co., of Walkerville, Ont., to restrain the respondent company from the use of the word "Gramm" in connection with the manufacture or sale of motor trucks has been decided by the court in favor of the complainant. The decision was to the effect that a perpetual injunction should issue, although the respondent maintained that the word at issue was generally used in the trade to designate a certain truck which both the defendant and plaintiff manufactured.

DIEHL MANAGING SALES.

William E. Diehl, manager of the Chicago branch of the American Hardware Company, has been appointed sales manager of the Corbin Screw Division of that concern and is now located at New Britain, Conn., assuming a part of the duties of Clarence A. Hart, who was, previous to his resignation to become vice president of the Hendee Manufacturing Company, Springfield, Mass., general manager and sales manager of the division.

S. A. E. SUMMER MEETING.

The details of the plans for the summer meeting of the Society of Automobile Engineers, which will take place at the new Cape May hotel, Cape May, N. J., June 23-26, have been practically determined, and according to the announcement the standards committee will meet the afternoon of

the first day. The business sessions will take place the afternoon of the second day, the morning and afternoon of the third day and the morning of the final day. The evening of the second day an entertainment will take place, and the following evening there will be a dinner and a lecture on the European trip projected for the autumn. The meeting will be concluded early the afternoon of the fourth day. The recreation grounds of the hotel will be open to the guests and various amusements have been planned in connection with the outing.



Type of Baker Electric 1000-Pound Wagon, Equipped with Flare Board, Screen Express Body, Utilized for General Purposes by the Delivery Company,

PALMER-MOORE 1600-POUND DELIVERY WAGONS.

THE Palmer-Moore Company, Syracuse, N. Y., is now producing two types of chassis, the one standard air-cooled, two-cycle, three-cylinder motor, and the other with an engine of the same design that is cooled by a thermo-syphon circulation of water. The motor has been built for several years and is well known from the fact that it has variable ports, this making possible the variation of the supply of fuel and the power production of the engine. The cylinder bore is four inches, and the stroke four inches, the motor being rated at 28.8 horsepower. The air-cooled type has been utilized for service vehicles and has been found to be specially reliable and enduring. The water-cooled motor was developed to meet the demands of those who prefer that type of engine and it has all the characteristics and qualities that have been peculiar to the Palmer-Moore motor.

The design of the Palmer-Moore motor is something out of the ordinary, it being maintained by the manufacturer that it is the height of development of the two-stroke cycle engine. The cylinders are cast separately with wide horizontal external flanges or fins about the expansion chamber, and vertical flanges about the head. The combustion chamber is spherical so that the gas is always ready to fire freely and there are no angles on which the products of combustion can accumulate and create carbon. One of the features of the construction lies in the oil ducts that extend from the base of the cylinder in the walls to a point just below the top of the piston when at its lowest point. These ducts are never opened at the upper ends, but they are always filled with a mixture of gasoline vapor that is permeated with oil (the same as that consumed as fuel), and this lubricates the walls of the pistons, the cylinders and the ends of the wristpins, affording positive lubrication and insuring against loss of power. The pistons are constructed with air chambers at the heads, which prevent the heat from combustion overheating the piston heads and the piston rings and wristpins.

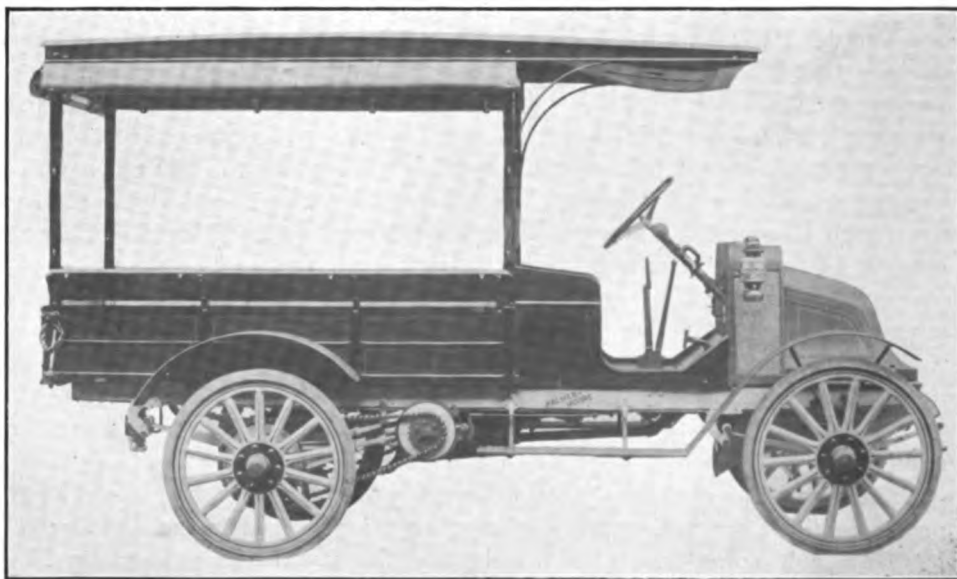
A distinctive feature of the Palmer-Moore motor is the valve construction. Instead of the usual form of inlet ports, which are constant in two-stroke cycle engines, the fuel is admitted through ports that are fitted with rotary shutters that are connected with linkage and set at any desired position for the immediate requirement. The ports may be so varied that the motor will have the exact volume of fuel to do a work, and the speed may be regulated

without causing irregular explosions or back-firing at low engine movement, or loss of power at high velocity. In other words, precise control is afforded by varying the opening of the inlet ports, and the operation of the motor is at all times smooth and even.

When operated in normal conditions and for ordinary work the motor can be best used at from 600 to 700 revolutions a minute, but should there be occasion the speed can be increased to 1000, which is a reserve for climbing grades, rough roads, sand, or where special power is essential. The statement is made that the design of the ports is productive of large fuel economy and there is all the advantage of a low speed engine, minimizing the wear on all bearing surfaces and reducing the probability of overheating. Another factor is the lessened noise of operation. The vibration is also correspondingly reduced.

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The motors are protected with French type of hoods, which afford access to all parts when raised, and every working part is easily reached. The motors are constructed to endure in continued hard service, having four main bearings, each 3.5 inches length, this giving 14 inches of bearing surface. The connecting rod bearings are 1.75 inches length. The bearings are all die cast from a fine quality of anti-friction metal.

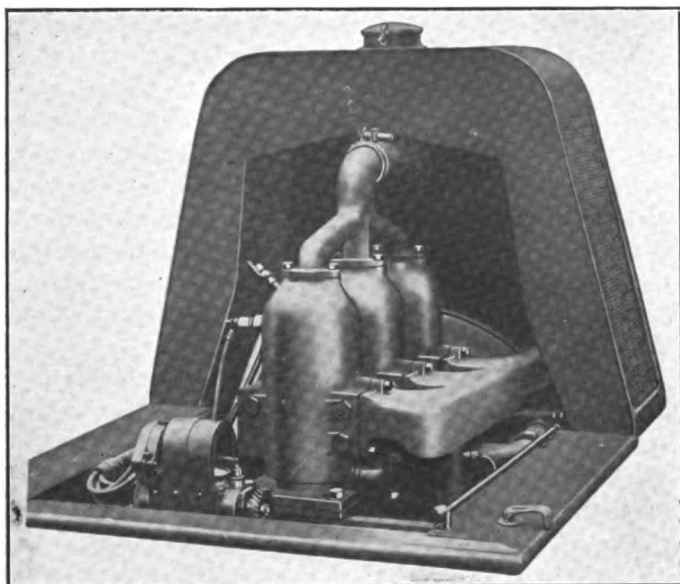


Palmer-Moore Water-Cooled Delivery Wagon Chassis Fitted with a Four-Port Express Body, Having Capacity of 1600 Pounds.

and are unusually well protected by lubrication. The motor is lubricated by mixing oil with the gasoline, but grease cups are provided for the main bearings as well. The ignition is by a Bosch high tension magneto with a fixed spark, so that there is no other control necessary in engine operation than adjustment of the fuel supply throttle.

The claim is made for the Palmer-Moore that it is extremely simple, that the moving parts are minimized, that the endurance is very long, that it requires minimum attention to insure maximum efficiency and power productiveness, and that it has all the steadiness and pulling power of a six-cylinder machine.

The clutch is a three-plate type, with a steel centre plate that is mounted between two fibre discs. The design is such that the engagement is always easy and positive and it does not drag when being released. It can be slipped without damage or excessive wear. It may be used with equally good results either dry or lubricated. The adjustments are simple and positive



The Water-Cooled, Two-Cycle, Three-Cylinder Power Plant of the Palmer-Moore Delivery Wagons.

and the discs can be used until worn through. The drive is through a planetary gearset having two forward speeds and reverse, or a sliding gear gearset giving three forward speeds and reverse, the driving shaft having two universal joints between the clutch and the gearset, with a self-aligning ball bearing between the flywheel and the universal joints. The gearset case is assembled as a unit with the jackshaft, the jackshaft housing being mounted in heavy hangers, with the service brake drums on the outboard ends.

The radius rods have three swivel joints, so that there can be no strain on the chassis, but the driving thrust is constantly taken and the axle relation preserved.

The pressed steel channel section frame is mounted on semi-elliptic springs carried on I section axles having 1.75-inch spindles. The wheels are the usual artillery type carrying 36 by 2.5-inch tires forward and 36 by three-inch tires at the rear. The steering

gear is an irreversible construction with a single lever on the hand wheel, and centre control levers for the changes of speed and the emergency brake. The service brake is operated by a pedal and the bands contract on drums on the jackshaft 10 inches diameter and two inches wide. The emergency brake shoes are internal expanding in drums on the rear wheels. The capacity of the chassis is rated at 1600 pounds. The wheelbase is 102 inches and the tread 56 inches. The weight of the chassis is 2300 pounds. The gasoline capacity is 12 gallons.

The materials used throughout the machines are high class, carefully selected for the purposes used, and specially adapted wherever necessary. Special attention has been given to lubricating all the wearing parts, and means have been provided so that adjustments can be made or compensation made for wear whenever necessary. In service the machines have given excellent satisfaction. The chassis are fitted with differing forms of standard stock bodies, or the purchaser has the option of having special equipment built to suit his own purposes.

GMC TO LIST MORE STOCK.

The listing committee of the New York stock exchange has received application from the General Motors Company for the listing of additional voting trust certificates representing \$714,000 par value common stock and \$583,000 preferred stock issued since the last application in 1911, and to list from time to time \$3,374,200 common stock and \$3,036,000 preferred stock now held in the treasury, on notice that the stock has been disposed of. This includes a total of \$4,088,200 common stock and \$3,619,000 preferred stock. Of the amount first specified \$520,000 preferred and \$520,000 common stock was issued in part payment for outstanding capital stock of the Weston-Mott Company.

GOODRICH TIRE GUARANTEE.

The reduction of the mileage guarantee for solid motor wagon and truck tires recently announced by the B. F. Goodrich Company, Akron, O., was on the types with the wireless base and was from 8000 miles to 7000 miles, and not from 10,000 miles, as was inadvertently stated in the February issue of the MOTOR TRUCK. The guarantee is for use within 12 months.

The Acme Tea Company, Philadelphia, Penn., which operates a chain of retail stores, and which has a delivery equipment of motor trucks and wagons of different makes, has acquired two 3000-pound White wagons, being the first Whites purchased.

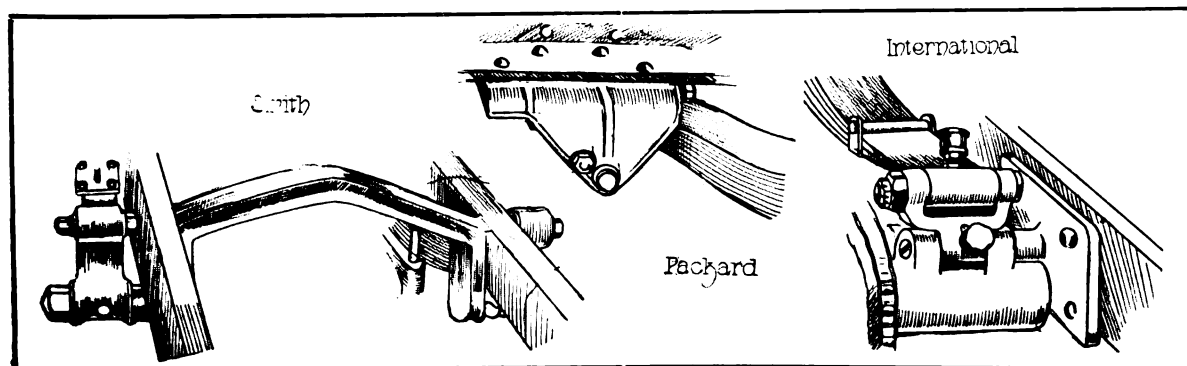
The plant of the Piggins Motor Truck Company, Racine, Wis., which concern is now in bankruptcy, has been purchased by E. N. McNab of Racine, and his intention is understood to be a rehabilitation of the business. No definite plans have as yet been decided.

CHARACTERISTICS OF TRUCK DESIGN.

Details of Improved Constructions Intended to Give Greater Accessibility and Endurance, Economy of Attention and Increased Efficiency in Service.

THE man investigating the qualities of motor vehicles that might be suited to a work, whether or not experienced, will necessarily estimate the rela-

made serviceable for years, and the usefulness would not end until the cost of maintenance became excessive. Motor vehicles have been used for much



The Combined Frame Cross Member and Spring Hanger of the Smith-Milwaukee Truck, the Spring End Guide of the Packard Machines, and the Shackle of the Light International Delivery Wagon.

tive values of the machines from actual or assumed knowledge of constructional details, and choice will no doubt be made after carefully weighing the different types without favor. That is, one can assume that a man buying a machine will endeavor to select that which, after careful appraisal, will seemingly have the most to recommend it. Few men will expect to find in any one machine everything that might be desirable. In fact the most skilled engineers will not agree on the value of applications, and for this reason it is impracticable for laymen to determine with anything like certainty what results are probable from varying applications.

There are those who will maintain that a single detail is sufficient to outweigh all others, or one factor may cause the rejection of a construction, and there are others who will measure everything by the price that must be paid. The machines that are found in the market are not as a rule completely tested through service, because actual determinations could only be reached by comparative work and observations extending over periods of time that would be equal to what is commonly known as the life of a machine.

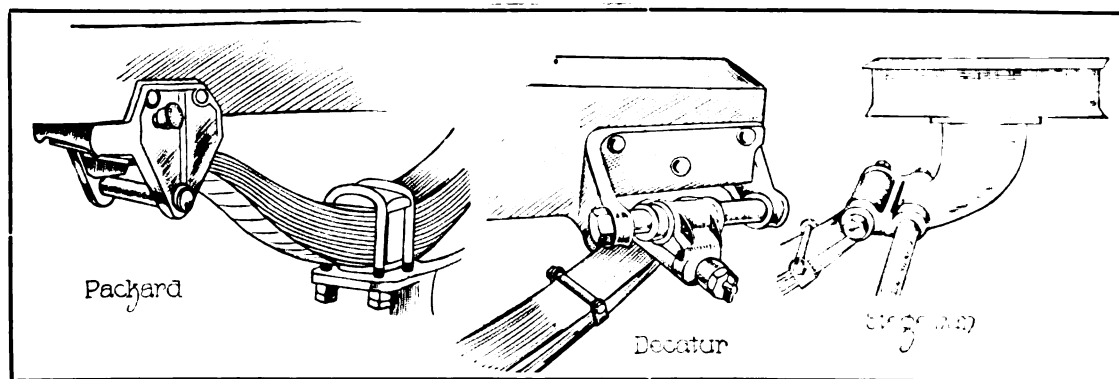
Most engineers hold that a vehicle ought to endure for years if renewals are made when parts are worn to a point where failure might be anticipated. In other words, by restoration a vehicle could be

with knowledge from experience more satisfactory results will follow.

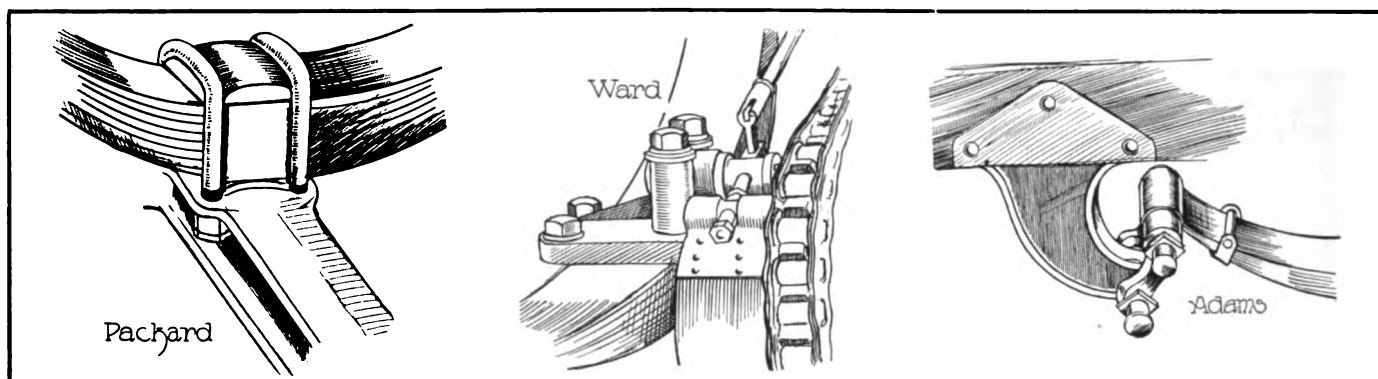
The prevailing belief is today that a gasoline motor wagon or truck ought to endure for five years with normal care and maintenance, and this prospect is based on what is believed to be good judgment. The majority of manufacturers will assume without hesitancy that any machine can be used in the widest varying conditions with economy for the length of time stated, while a few builders are inclined to base the period of serviceability on number of miles driven. The mileage is probably as accurate for estimating as time, and yet neither appears to be very definite. Yet when one considers the possibilities with any other utility the extremely wide variance with reference to usefulness is evident.

Improvements and Refinements.

The motor vehicle builder is in no different position than any other manufacturer aside from the fact that comparatively few can show a continuous experience for a period covering the usually accepted life of a machine with an unchanged construction. With



The Spring End Guide of the Packard Trucks, the Sliding Shackle of the Deaatur Suspension, and the Rod-Braced Spring Hanger of the Stegeman Design.



The Spring Saddle and Spring Clips of the Heavy Packard Machines, the Combined Spring Saddle and Brake Shoe Support of the Ward Design, and the Spring Hanger of the Adams Trucks.

rare exceptions some changes are made in design and construction, these usually being regarded as "refinements" or "perfections", and often of a character that appears to be trifling.

But in the majority of instances these so-called improvements are made with a view of increasing the wearing qualities, strengthening weaknesses and eliminating conditions that might result in premature failure, or at least insuring against causes that, if continued, would require excessive repair cost. Considering the changes in design from the viewpoint of the manufacturer it may be regarded that none is made except for a satisfactory reason. When a type is manufactured every detail must be provided for, and if production is made in considerable numbers manufacturing economy demands that machinery and other equipment be procured. If changes are decided on these must be made first in the engineering department and then in the production division, and in addition the vehicles in service must be considered and provision made for meeting with any requirements for their maintenance so long as they are in use. And for this reason when a material change is decided on it is usually the result of careful experiment and extended trial.

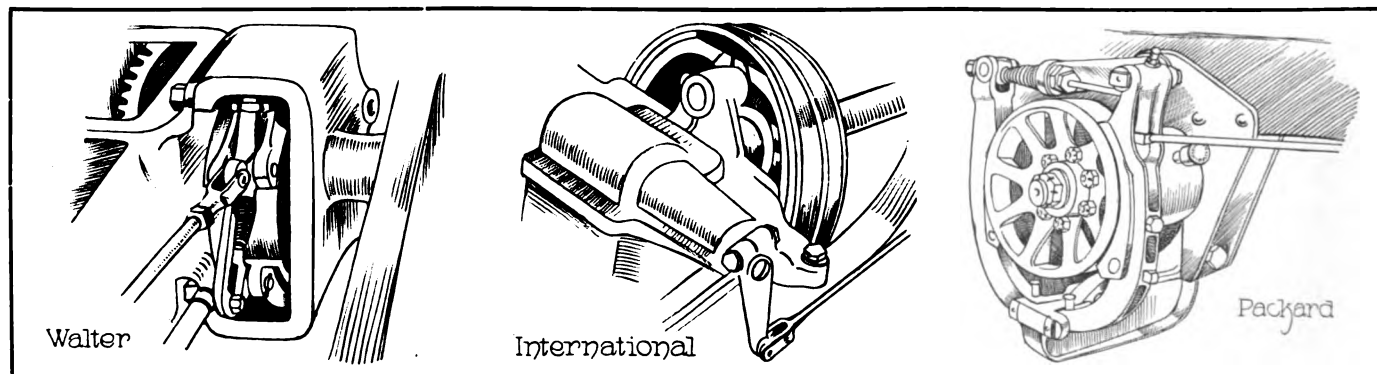
The character of improvement is decidedly important. It may be for the purpose of affording greater accessibility and minimizing labor that is necessary in attention and repairing, for reducing the wear, to better distribute stresses and obtain a more stable structure, to minimize possibilities of damage, to increase strength, to lessen weight, and to generally accom-

plish results that have a substantial purpose, these all having to do with structural endurance and longevity. Further than this are considerations equally satisfactory, providing for better lubrication, for economy of fuel, for convenience, for easier or more certain control, and, perhaps, appearance.

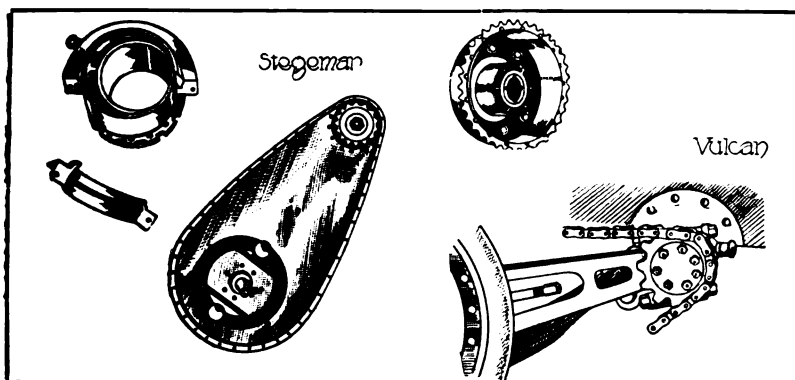
Designer Considers Chassis.

The designer of a service wagon or truck considers the chassis only, and so to a large degree the appearance is dependent upon the type of body that is installed, but because of the acceptance of general characteristics as desirable and the knowledge that this factor is often given material weight by probable purchasers, the engineer will seek to have his creation conform so far as may be practical with what are usually recognized as conventionalities of motor vehicle practise. This may be applied to the location of the dash, radiator, the form of the hood, shape of the fenders and different details that have no important bearing on endurance or service, and have no essential worth from any viewpoint, although these might influence a purchaser who attached the same value to them that one might establish in purchasing a pleasure car.

In estimates of motor vehicle value on the basis of design, obviously the quality of each detail must be understood. The first consideration is endurance, and this may be obtained by the use of material of high quality, or of sufficient proportions to resist the strains and stresses. The grade of metal is highly important when extreme strength and minimum weight are required, but so far as service machines are concerned



The Partially Housed Jackshaft Brake of the Walter Trucks, the Internal Expanding Main Shaft Brake of the International Wagon, and the Locomotive Type Jackshaft Brake of the Packard Machines.



The Combination Radius Rod and Chain Case of the Stegeman Truck, Adjustable by a Spherical Eccentric at the Jackshaft; the Bolt-Secured Jackshaft Sprocket of the Vulcan Design.

wheels, and the driving thrust is directed against the chassis frame by the radius rods or the torsion tube, as, with rare exception, the shackles swinging as the springs take up ends, and the thrust is that of the angle of inclination of the rods or tube. With light machines the rear springs are generally shackled, and with deflection as the springs are straightened the full action is possible, the shackles swinging as the springs take up or absorb the strain and really making possible a spring of the semi-elliptic form.

Because of the necessity of having sufficient spring strength to support a

load the action when a vehicle is light is exceedingly slight, and the road shocks are communicated through the construction almost to the same extent as if there were no springs. But under load the springs absorb a great deal of the vibration, this entailing almost constant action at the spring eyes and consequently a great deal of wear. The eye of practically any semi-elliptic spring is formed by turning over the end of the master or upper leaf, or perhaps the eye may be forged solid. As the spring is always tempered and will wear slowly engineers assumed that a spring would be sufficiently enduring, but experience showed that the bolts wore rapidly and when these were hardened the springs, which are much more valuable, wore, and so a compromise was made by the use of bronze bushings in the spring eyes which could be replaced when worn, which were in a measure self-lubricating, and when these were used with hardened bolts and fitted with grease cups the destructiveness of the spring action was largely overcome.

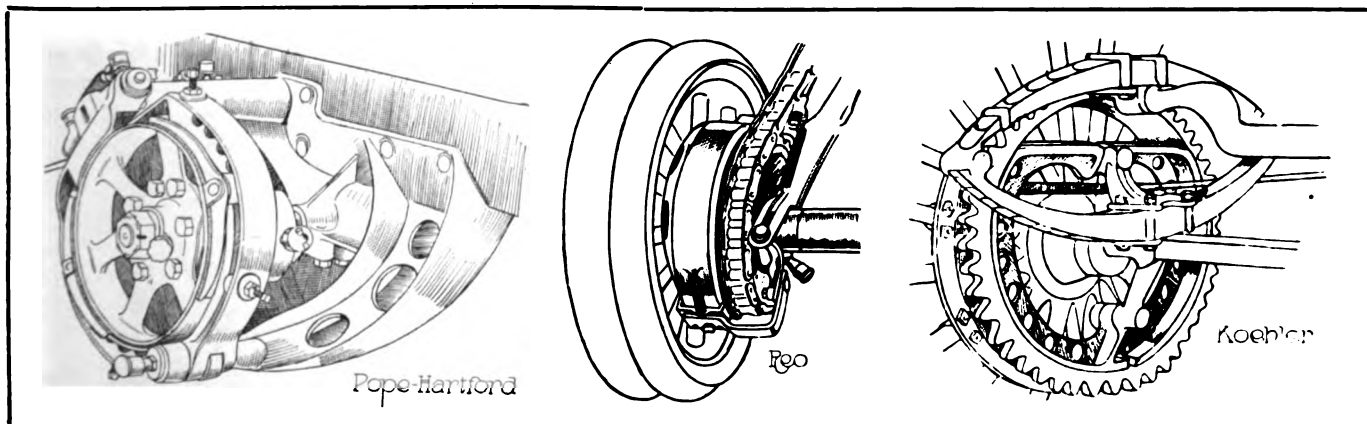
Strength of Components.

One purpose that is apparently shared by a majority of engineers is the making of components of such size that they will endure excessive strain, and vehicles of comparatively small capacity have the appearance of being unnecessarily heavy, but experience has taught that parts must be sufficiently large to resist every wearing influence. One may believe that the part itself is the only thing to be considered, but when one understands that breakage or failure may result in damage to other components, and that the whole assembly must be regarded rather than a single part, the wisdom of sufficient strength is apparent. The experience of many owners has been that constructions have been made too light and endurance has been sacrificed because of the supposition that weight might be saved and power economized. Not only this, with the very general inclination of owners to overload machines the strains and stresses upon constructions have been largely increased.

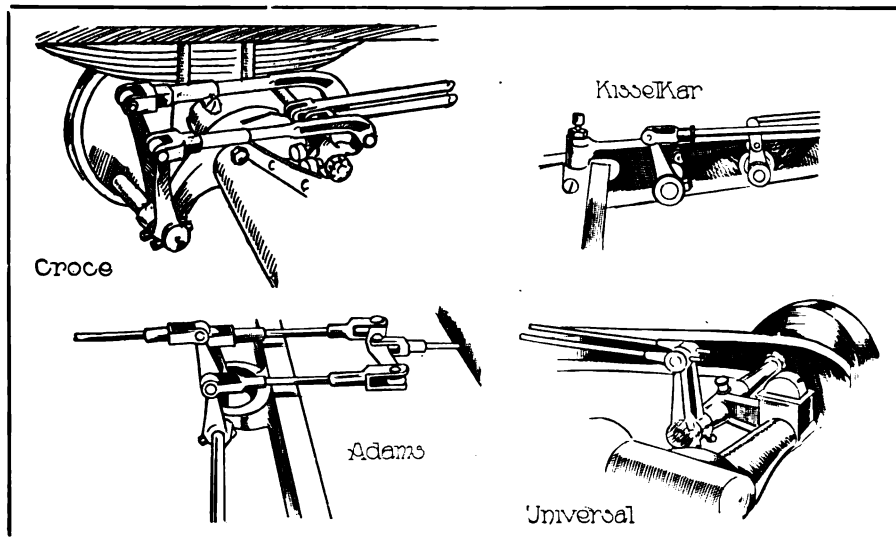
The traction effort of a motor vehicle is greatest in starting a load from a standstill or "anchorage", and with the usual form of drive this is exerted at the rear

load the action when a vehicle is light is exceedingly slight, and the road shocks are communicated through the construction almost to the same extent as if there were no springs. But under load the springs absorb a great deal of the vibration, this entailing almost constant action at the spring eyes and consequently a great deal of wear. The eye of practically any semi-elliptic spring is formed by turning over the end of the master or upper leaf, or perhaps the eye may be forged solid. As the spring is always tempered and will wear slowly engineers assumed that a spring would be sufficiently enduring, but experience showed that the bolts wore rapidly and when these were hardened the springs, which are much more valuable, wore, and so a compromise was made by the use of bronze bushings in the spring eyes which could be replaced when worn, which were in a measure self-lubricating, and when these were used with hardened bolts and fitted with grease cups the destructiveness of the spring action was largely overcome.

Where the springs are suspended by shackles that are simply side links, the simplest form of construction, the hardened bolts and bushed spring eyes meet all requirements for wear, these having the merit of durability and cheapness, but when a special form of shackle is required and the cost of these increases, the need of protecting them becomes a matter of importance, and this is frequently done by the use of bronze bushings for the eyes. In platform spring design the



The Locomotive Type Contracting Jackshaft Brake of Pope-Hartford Trucks, the Contracting Band Brake of the Reo Machines with the Sprocket Withdrawable Through the Drum, and the Combination Brake Drum and Sprocket of the Koehler Delivery Wagons.



The Brake Shafts and Linkage of the Croce Trucks, the Equalizing Device of the Adams Machines, the Brake Shaft Support of the Universal Worm-Driven Design, and the Brake Levers of the KisselKar 2500-Pound Wagon, Mounted on the Radius Rod.

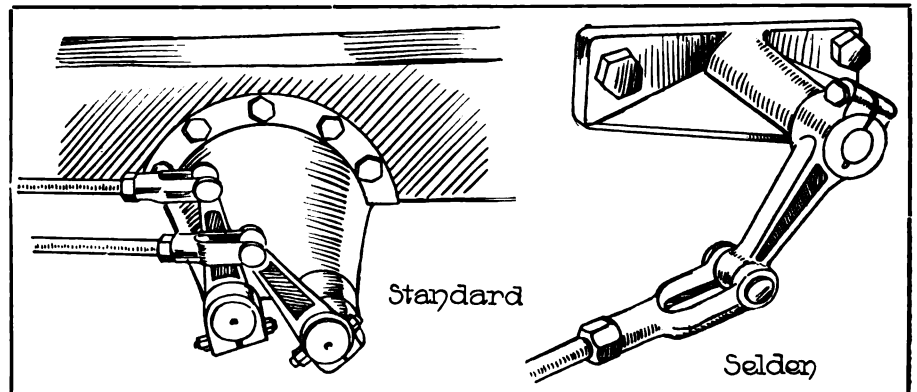
purpose is to afford a universal action that will allow the side and cross members to be deflected equally and without strain, and the shackle blocks are necessarily subjected to a great deal of wear. These are usually fitted with bronze bushings and hardened steel bolts, so that by the renewal of the bushes restoration can be made.

The use of spring shackles is practically universal throughout the industry, but while these are in a sense necessary with front springs, because the driving thrust is exerted through the master leaves to the spring horns of the chassis frame, and the action from deflection or reflection must be compensated for at the rear end, in the heavier Packard trucks the rear springs are installed in guides that are bolted to the frame side member, these guides having a roll carried on a shaft between the two sides. The frame web is strengthened at the guide to insure against buckling. The ends of the spring are placed in the guide and above the roll, and as weight is added the deflection and consequent lengthening of the spring is permitted through the guides, the rolls preventing the spring

binding and insuring free action. The guides are the width of the spring and there is no side pressure, the chassis frame being supported at all times, sideway being minimized. In this construction, which is not new in wagon or motor vehicle practise, the master leaf is relieved from the excessive strain, and the pressure is more equally distributed. With this installation the spring is free from the thrust of driving, and while there is not the quick action that is to be found with springs connected with shackles, the results have been extremely satisfactory. The guides are well lubricated by grease cups and the spring ends are not subjected to wear, because the bearing surfaces are so large. One distinct advantage

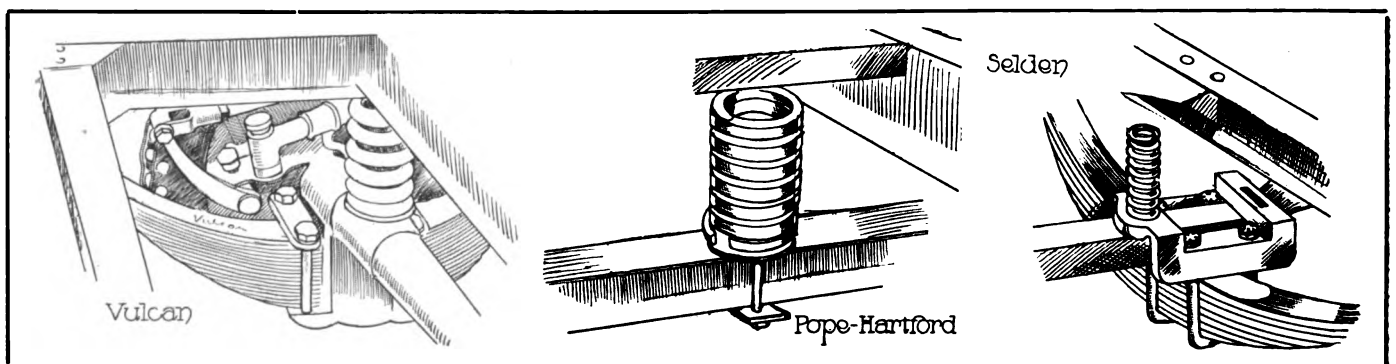
is that there is never any lost motion from wear, the frame always resting on the wide spring and having this support at all times.

A construction that provides for a somewhat similar effect for lighter vehicles, and which seemingly has a great deal to commend it, first made its appearance



The Double Brake Shaft Bracket of the Standard Truck, and the Single Brake Shaft Bracket of the Selden Machines.

in the Decatur delivery wagon. This provides for the use of shackled ends that move longitudinally on horizontal guides with the deflection and reflection of the springs. For obvious reasons the guides are mounted outside of the side members of the frame, this increasing the width between the springs, lowering the cen-



Examples of the Installation of Helical Auxiliary Springs: The Axle Seat of the Vulcan Design, the Easily Removable Pope-Hartford Spring, and the Combined Spring Saddle and Seat of the Selden Wagons.

tre of gravity, and lessening the sideway and its attendant stresses.

Some of Its Advantages.

The practicality of the guide form of suspension cannot be questioned, and the results are decidedly satisfactory. The guides are of sufficient length to allow full deflection and reflection of the springs, and they are primarily of shallow yoke form, a solid bolt extending between the yoke arms. On this bolt, having a long bearing, is a short yoke. The bearing can be bushed with bronze if desired. The yoke can be moved slidably on the bolt. The yoke arms are transverse of the bolt and between them the spring is mounted with a bolt through an eye formed by turning or solid forging the master leaf of the spring. The best construction is with a bronze bushing for the spring eye. One of the advantages claimed for this construction is the "dampening" effect upon the spring movement because of the friction of the long yoke member sliding on the bolt of the guide, this making for easy movement and yet offsetting any strain, the position of the spring being maintained without stress, no matter what the distortion of the chassis frame.

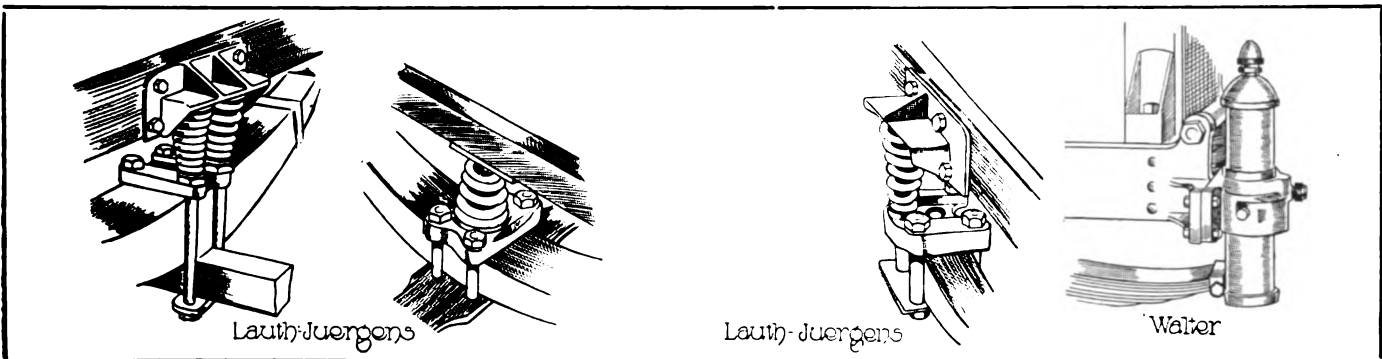
shackle linkage is not constructed to endure extreme sideway, and when the shackles are of such length as will insure good deflection and reflection, the strain upon the links and the bolts is necessarily wearing. Obviously the shorter the links the stronger the construction.

PETTIT LEAVES COMMERCE COMPANY.

W. S. Pettit, who has been for a considerable length of time manager of sales of the Commerce Motor Car Company, Detroit, Mich., has resigned that position and is now taking a rest preparatory to making another association in the trade. He was advertising manager of the Studebaker Corporation before he became associated with the Commerce company.

NOT THE KELLY-SPRINGFIELD.

Considerable annoyance has been caused the Kelly-Springfield Motor Truck Company, Springfield, O., recently, through the publication of a statement concerning the Kelly Motor Truck Company of the same



The Auxiliary Springs in Lauth-Juergens Designs, the Single Forms for Front and Rear of Light Vehicles and the Front of the Heavy Types, and the Double Form for Rear Support Only—The Westinghouse Shock Absorber as Installed on the Front Springs of Walter Trucks.

The suspension adds materially to the flexibility of the frame suspension and eliminates any side pressure upon the springs, insuring the fullest resilient effect. This form of construction could be applied to the rear ends of the forward springs by offsetting the forward spring horns, and would minimize the side pressure in the event of the chassis being twisted. Seemingly this suspension would be advantageous with under-slung springs, in which the arc is much more pronounced and the length is greater, there being more sideway and consequently greater stress upon the springs between the spring seats and the shackles, this being a factor of considerable importance. While the "twist" of the spring is resisted by the attachment of the spring at the seat upon the axle, the strain is borne entirely by the spring clips, and these are occasionally broken by the combined effect of tractive effort and the excessive sideway, especially when a heavy load is carried. One of the greatest objections to under-slung suspension is the excessive effect of sideway, which is particularly noticeable when a load is not well distributed, and when vehicle is on a surface that has considerable crown. As may have been noted, the

city. The last mentioned concern, which has no active existence, and is liquidating, reduced its capital to \$5000, this being sufficient for the purpose of maintaining its organization until all claims against it have been settled. Many persons accepted the statement as referring to the former company, which has no connection with the other. The Kelly-Springfield Motor Truck Company has made no changes in its plans other than to prepare for an anticipated increase.

E. H. H. Fletcher, who was for more than a year in charge of the Stewart division of the E. V. Stratton Company, Albany, N. Y., has been appointed district sales manager for the Stewart Motor Corporation, being assigned to northern and western Pennsylvania, New York State and the provinces of Quebec and Ontario of Canada.

The fire department of Baltimore, Md., has purchased two three-ton White truck chassis, which will be especially equipped with apparatus to meet special requirements. The department now has 10 White chassis, eight of them fully equipped.

THE MOTOKART 400-POUND LIGHT DELIVERY.

THE Motokart, built by the Tarrytown Motor Car Company, which was recently re-incorporated with capital of \$500,000, is specially designed for those who have need of a small delivery wagon with practically unlimited radius of movement and moderate speed. The factory is at Tarrytown, N. Y., and the executive and sales offices at 1790 Broadway, New York City.

The Motokart is not a cyclecar. It is designed for delivery service, and is built to be economical of labor, of fuel, of maintenance and upkeep expense. While the weight is minimized, the machine has a wide margin of safety in its components, and ought to endure for long periods of time. The Motokart is intended for parcel delivery, for the service of the small business man who desires to afford his customers every convenience, or for the large business that has a considerable volume of comparatively small packages to deliver. The normal capacity is 400 pounds.

The weight of the machine is approximately 700 pounds, and its size is such that it may be housed in a store at the close of business. The design differs from the conventional in that the motor is housed under the seat of the driver, the forward portion of the chassis carrying the body. The seat may be entered from either side without inconvenience, which is a factor in saving the time of the driver. The seat is not furnished with a top, but this protection could be installed if desired.

The motor is a two-cylinder, four-cycle type with cylinder bore of 3.63 inches and stroke of four inches, and is rated at 10-12 horsepower. The cylinders are cast singly. The design is to standard principles and the lubrication is a combination of force feed and splash. The cooling of the engine is by thermo-siphon circulation through a large honeycomb radiator, which is stated to be efficient in all conditions of operation. The engine is accessible by removing the side panels of the driver's seat. The power is transmitted

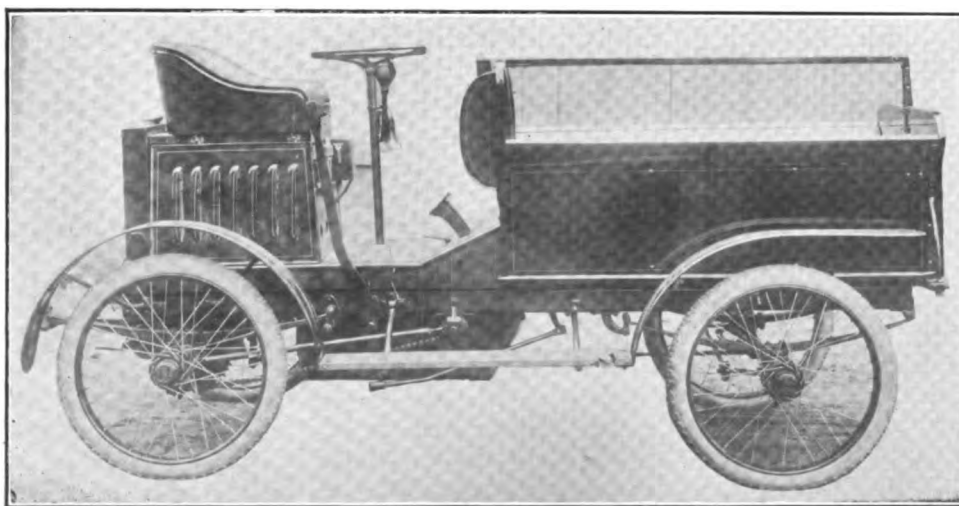
from the engine by friction contact, the engine driving a large disc that in turn drives a wheel on a jackshaft, and movement of the driven wheel from one point to another on the face of the driving disc affords every ratio of speed. The power is transmitted from the jackshaft to the live rear axle by a single chain, this being positive and extremely flexible, so that with a constant speed of the motor the movement of the vehicle may be varied from four to 25 miles an hour.

The simplicity of the friction contact power transmission is such that any intelligent boy or man can be taught to operate the Motokart in a few minutes. The power can be graduated to meet any requirement, no matter what the grade or the condition of the road, and there is no possibility of damage because of lack of judgment. The method has been known and used for years with admirable success, especially with light vehicles.

The chassis frame is pressed steel channel section, and this is mounted on semi-elliptic springs, the driving thrust of the rear axle being taken by radius rods. The axles are of steel tube of ample size and the spindles, especially those of the steering knuckles, are unusually large. The wheels are of wire construction and are shod with 26 by 2.5-inch tires, these being of the non-skid motorcycle type. The machine is controlled by a vertical steering column and hand wheel located in the centre of the footboard, and by an accelerator and pedal that operates the driven disc. A hand lever operates the driven wheel on the jackshaft. The brake is actuated by a second pedal. The chassis is fitted with running boards and fenders, a tool box being carried on the left running board.

The chassis is fitted with both open and closed bodies, but the latter is usually provided, this being constructed of steel and is 51 inches length and 32 inches width and height. The wheelbase is 69 inches, the tread 44 inches, the overall length 106 inches, the overall width 52 inches, and the extreme height 52 inches.

The Motokart is extremely economical to operate, for while its mileage is comparatively large the fuel consumption is very small, the tire cost is trifling, and the other expenses are proportionate. The capacity of the vehicle is limited, but there are many thousands of business men, who for delivery, seldom send out a load that would be excessive for it. The price for which it is sold is less than would be paid in open market for an average horse and wagon, and the operating cost of the Motokart would be decidedly less.



The Standard Motokart Light Delivery Wagon Chassis with Open Express Body, Having Capacity of 400 Pounds.

LONG USE PROVES TRUCK UTILITY.

Well Planned Loading Facilities, Sane Driving and Consistent Maintenance Afford Practical Economies from Machines Serving Wholesale Grocery Routes.

THE provident business man whose attention has been directed to the possible economies of highway transportation is chiefly concerned in lowering the cost of the work he has to the lowest practicable point. Desire and sentiment are lost sight of in the endeavor to save money that might be regarded as needlessly spent, and so far as he is concerned his only purpose is to utilize the means that will insure to him the necessary work. There are those who regard appearance, but the practical man is often willing to sacrifice this if utility does not suffer, and there are few men who believe that work can be done constantly and paint and varnish maintained in the condition that it was originally.

The man whose haulage service is large has an entirely different condition to deal with than has the man whose equipment is comparatively small, and no one will take issue with the statement that the expense with the large service is less for each unit than where the units are few. When comparisons of the large and small installations are made, and perhaps similar types of vehicles are used in the same conditions, the difference may be marked, for, generally speaking, the results are proportionate to the character of administration.

The fact that the small transportation service costs relatively more than the large, however, is no reason why economy does not obtain, although it may not represent the minimum expense as measured by the results realized by the large installations. There are those who may believe that the cost of operating ought to be the same for each unit in use, assuming a stated expense for each, and that increase should be a progressive ratio, but there are numerous variables that are dependent upon circumstances and conditions, and are not governed by rule or standard.

Demonstration of Possibilities.

The change from animal to motor transportation equipment may be favored by those who have considered the subject carefully, but rarely is a service motorized without experimentation. The actual demonstration of possibilities is believed to be practical with the majority of business men, although few of them realize that the use of the single vehicle is actually

more costly, and that they seldom obtain maximum efficiency because of the lack of knowledge of the methods that will afford the best results. Firms that have large resources are not adverse to extended trials of motor equipment, and in many instances these have been made with perhaps a single vehicle, so one cannot say that this policy has not justification.

There are thousands of business men who have haulage requirements that necessitate the maintenance of equipment, and without question the subject of economy is always a consideration with them, but with rare exceptions they are adverse to purchasing because of the assumption that they cannot afford to make investment where there is the slightest uncertainty. They are willing to admit that others have utilized machines economically, but maintain that motor vehicles have

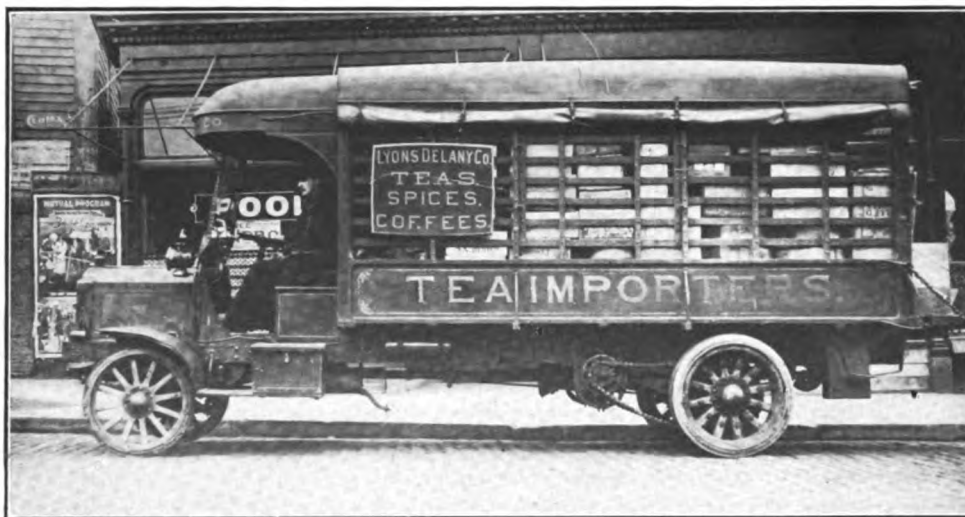


No. 1 Packard Truck That Has Been Driven 38,500 Miles in Three Years and a Half in Distribution for a Wholesale Grocery, with an Average Load.

not been sufficiently tried. Some base their judgment on their experience with pleasure cars, or point to instances where wagons or trucks were used with unsatisfactory results, not believing there was an excellent reason why the machines were regarded a failure.

Few men will willingly admit that their methods were responsible for the lack of efficiency. Experience has demonstrated that the majority will condemn a vehicle as an extravagance when no attempt has been made to utilize it to advantage, or it has been so used that maintenance has been costly. A reason very generally assigned is that "conditions are different", but conditions are often what the owners make them.

The value of example is unquestioned. Those who are investigating the utility of motor trucks and wagons may have greater confidence in facts that come within their range of observation, but service



No. 2 Packard Three-Ton Truck, That Is Driven 35 Miles a Day and Has Been in Service Three Years.

that has been extended over a period of several years cannot be regarded as experimentation. One can say with reasonable assurance that such experience ought to be particularly valuable, and from it deductions can be made that can be considered as established by practice. The experimental period has undoubtedly been passed and the service placed on what may be said to be as near a business basis as could be assumed.

For those who have need of delivery equipment that will serve an area within a 10-mile radius, carrying capacity loads a considerable part of the time and making emergency trips whenever necessary, the experience of the Lyons Delany Company, Pawtucket, R. I., wholesale dealer in teas, coffee and groceries, can be studied with extreme interest, for this covers a period of about three years and a half with one truck and nearly three years with another, these taking the place of animal vehicles. The results have been satisfactory as a whole, and yet the use of the machines has developed another aspect of delivery that is decidedly interesting to the business man. This does not mean that the trucks have not been efficient or enduring, but brings out the question of obtaining the largest economy that is possible in store delivery. And in this the attitude of the firm is that of best serving its customers and spending the smallest amount that is necessary for the work.

Lyons Delany Delivery Service.

The Lyons Delany Company is the development from a retail tea and coffee store established in 1876, and this led to wholesaling, later to dealing in spices and extracts, and eventually to groceries. The company still maintains a retail store for all save groceries. Delivery from this is comparatively small and is not considered in this article. The retail department is entirely apart from the wholesale division and the warehouse, which is located at 88 East avenue. The spice mill of the company is another department. For years the company dealt largely in teas, coffee and spices, its customers being all over southern New England. With the addition of groceries the volume of goods distributed materially increased, but outside of

the area stated these are sent by freight or express, and the delivery by trucks is to what may be termed locality custom.

The business of the company for which delivery is made is in Pawtucket, Central Falls and the towns of Cumberland and Lincoln on the north, where the furthest point reached is Ashton, about six miles distant, a portion of the town of East Providence, and the city of Providence and several villages in the town of Johnston. Of these Manton, about eight miles, is the farthest distant from warehouse.

The delivery is not made to a schedule, for conditions must be regarded, but the intention is to serve the customers as quickly as this can be done, for the business is necessarily competitive and considerable depends upon the rapidity of filling orders. The greater distance as compared with the Providence firms necessitates use of equipment that will minimize haulage, and this was one of the reasons the company decided to use a motor truck. The company did not propose to confine itself to the trade north of Providence, and with other conditions equal prompt delivery was essential to attract and retain custom. Because the business is so widely scattered a greater number of animal vehicles would be necessary than were the distribution made from the centre of the business section of Providence.

With First Truck Purchased.

The first truck purchased was a three-ton Packard machine which was equipped with an express body, this being built with a standing top with rack sides, with side and rear curtains, the driver's cab being a separate construction. When this was placed in service it was utilized for delivery in Providence and the more distant customers, animal wagons being used for the nearer deliveries. The use of the machine was given careful attention and to insure satisfactory efficiency its work was closely observed and record made.

With a single truck a garage was not considered, but contract was made with a local public service station for regular storage. The driver engaged was experienced in mechanical work, and while he was made responsible for the condition of the machine aside from results from normal wear, he was not required to devote a great deal of time outside of the working hours to attention to it. The service station specializes in repairing, and an arrangement was made whereby the machine was to be given whatever attention was ordered by the firm, the driver making report of the condition at the end of the day, and the foreman of the garage being instructed to note the operation of the machine when brought in at night that his advice

might be added to the observation of the driver.

The understanding of the owner of the station was that the machine was to be worked on whenever necessary so that it should be ready for service in the morning, and that meant that should there be occasion the garage men would work until a repair was complete and that there be a sufficient number to finish any undertaking when begun. In addition to this the garage was to make inspection of the truck to determine its condition. Later on, with the establishment of a Packard service station at Providence, the Packard system of inspecting was applied to the machine, and the company had the option of having its repair work done there or at the garage where the truck was stored.

The reliance upon the truck necessitated that it be always in condition for use so far as this could be provided for by foresight. The cost of operation was carefully noted. The work of the machine was two or more Providence trips with a Blackstone Valley delivery, the mileage averaging about 40 miles a day. The purpose was to carry a capacity load whenever possible, but instead of the work being based on tonnage the cost of delivery was figured on the basis of packages. That there might be practical uniformity of bulk and weight an average case of goods, or several small lots composing a single order assembled in a box or crate, was rated as a single package. Of course the weights varied materially, but this was believed as accurate a record as was necessary to arrive at practical results.

Location of Warehouse.

The warehouse fronts on a wide street, and there are no side or rear entrances. To load or unload without blocking the sidewalk, to escape delays that might result from traffic if goods were carried across the walk either to or from the truck, to have shelter in the event of heat or storm and to have the work of the men unimpeded, a loading stall was made that is approximately 25 feet depth and 10 feet width, the space being sufficient to house a truck with considerable spare room. Into this the truck can be driven on the level of the street. The floors of the shipping department and at the rear of the stall are at a height that is extremely convenient for handling the freight. In cold weather the doors at the front of the stall can be closed, so the workers are not exposed.

The shipping room is large and in this the orders are assembled in separate lots, the smaller being placed in bins for checking and packing, and the

others collected in separate piles. The layout was planned with a view of economizing the work of the shipping room force and the crew of the truck. The orders are made up each day for the afternoon delivery and the morning of the day following in the event of two deliveries, or for the entire day following should there be but one delivery. This applies to regular work and not to emergency or special trips.

Provision for Loading.

Regarding these facilities for a moment it will be understood that when the truck was put in service conditions for obtaining good results were much better than with the average place of business. The truck could be loaded or unloaded without loss of time of the men or the machine from any of the usual causes, and this meant that so far as the owner could control conditions this had been done, and the results with regard to time required for covering the routes and for delivery rested entirely with the driver. These were no doubt some of the reasons why the company found that the machine was economical.

Considerable attention was given to loading. The layouts of the routes were determined by the driver, who decided the order of stops, and with these the shipper arranged the loading, the freight being loaded in reverse of unloading, the plan permitting the shipping room force and the truck crew to handle a shipment very quickly. The policy of the head of the department is that all the help that can work to advantage should do the loading, this saving the time of the machine and better serving the customers.

Second Truck Acquired.

At the expiration of six months the company found that the economy of the first truck was such as to justify the purchase of the second. The quicker service, the larger capacity of the machine, the better satisfaction of customers, as well as possibilities for ex-



The Loading Stall in the Shipping Department of the Lyons Delany Company, with Entrance from the Main Highway, Insuring Against Delays in Handling Loads.

pansion all contributed to this decision, and the company took delivery of a second three-ton Packard truck. The same policy with reference to maintenance and care was continued with this, the belief being that there was economy in paying for storage at a public station rather than establishing a garage, equipping it and employing a mechanic to care for the trucks. Were the installation of considerable size the private garage would no doubt be a logical adjunct, but with the method of maintaining the machines the expense was decidedly less than with any other.

With the acquisition of the second truck one was assigned exclusively to the Providence routes and the other to those in Pawtucket and vicinity, and either is now utilized in the event of need for special work. The service is so arranged that the hours of loading do not conflict and neither machine is delayed at the warehouse, while each driver is expected to cover the routes in the quickest time that is consistent with the work to be done.

Each machine is driven an average of 35 miles a day, and this is maintained the year through. The No. 1 truck has been driven approximately 38,500 miles and the other about 32,000, or very close to 11,000 miles a year. This mileage is not extreme, but it is probably very close to the work that would be required with the majority of wagons or trucks.

Expense of Operation.

The records of the company show that with accurate figures as to overhead expense and to every detail of operating, which included the storage in a public service station and the necessary attention, the cost when the machines were the first year in service was about \$10.50 a day, or \$63 a week, but as the period of use has lengthened and the expenditures for repairs have become more the cost has increased to about \$12 a day, or \$72 a week. Considering the mileage, this expense figures roughly 34 cents a mile.

In discussing the trucks L. F. H. Delany, who directs the wholesale business of the company, says that from the viewpoint of the concern the machines have been satisfactory. He does not make extravagant claims for possibilities for work, for there has been no reason to make unusual mileage and the requirements have been reasonable. While it might be possible to make the same delivery with horses, the convenience and satisfaction obtaining with the machines would not be realized. The company has not materially extended the area in which it delivers to customers, but the trade has been given the fullest attention and the increased business has been provided for without extreme demands upon the vehicles or the men working them. The company has a single-horse wagon in service with which deliveries and general work is done, but aside from this the haulage is done with the trucks. Mr. Delany says that the machines have been worked rationally and never with the purpose of doing excessive volume of haulage.

Before the trucks were bought the requirements of the company were evident enough, and the first one

in service was naturally more or less an experiment, but careful observation and change of method soon adjusted any condition. The records first kept made possible exact knowledge of the work and a saving was found practical. He says that he might liken the machines to the installation of an elevator in a building. They cost money, just as any other modern requirement, but the convenience and the saving are evident.

The trucks have been kept in operation and have been worked in all conditions of the business with practical success. The results were equally good in winter and in summer, and aside from the use of chains in winter there was practically no difference in cost of operation. He does not believe in overhauling at intervals, but maintains that the trucks can be kept up with attention to the results from wear without withdrawal from service, for loss of time means expense in substituting other machines or horse wagons. He has found that as the use of the machines continues there is increase of expense of operation. The operating cost of the trucks at \$10.50 a day is considerably less than is estimated for average work, and the maximum figure is somewhat smaller than is usually allowed for machines of similar size, so it can be seen that with a comparatively small equipment the expense has been kept down by good management.

Cost of Delivery.

Mr. Delany says that he has carefully determined the cost of delivery on the package basis and he has found that the average is 10 cents, but he is not satisfied with this figure, for he believes that the greatest economy is not in reducing the delivery expense with reference to animal haulage, but in lessening it with whatever form of transportation is utilized. That is, he is just as desirous of economizing with the machines as he was with horses, and he does not care what form of transportation is used, provided that he can serve his customers to their satisfaction and obtain the results sought. Each time the cost is figured consideration is given to possibilities of still further reducing the delivery expense, but not at the sacrifice of the machines.

Relative to tire cost, Mr. Delany says that he has no complaint to make of the service he has obtained, and that he has found the tire manufacturers very fair in their dealings with him. Because of the heavy loads carried the four-inch dual shoes with which the trucks were equipped were removed and five-inch duals installed, and since the change was made the tires have worn well. He says that if a tire wears evenly he has no complaint to make, but if a shoe goes to pieces he asks for an adjustment and is given satisfactory allowances.

He says that the storage of the machines in a public service station has worked out excellent results. The drivers are expected to do their work on the trucks and they are not asked to devote themselves in overtime to repairing. They are capable of making whatever adjustments may be necessary and their re-

ports to the office are followed by instructions to the garage or to the service station to do whatever is needed. Of course the garage or the service station foremen may make additional report after examination, and if such is received authorization is given to whatever extent is believed desirable. No neglect of the machines is permitted, however, but work is not done without reason.

The arrangement of the loading stall was a development from necessity, as there is no entrance at the side or rear of the building from a street or alley, and carrying freights across the sidewalk would mean the loss of time of the trucks and the men, which in the aggregate would reach a very large sum. Backing the trucks to the building would mean blocking the walk, which the city would not permit. The location of the stall prompted the storing of the stock so as to convenience handling, and the shipping room is so laid out that the men can work to the best advantage.

Mr. Delany says that these details result from observation and purpose to do work conveniently, and not with regard to theory or science; simply common sense and the utilization of any idea that appears practical, and a willingness to try whatever appears to have merit. The period of experimentation with machines has passed and the company has minimized its records, for there is no need of facts that are absolutely established. Cost is the only need, because this is the basis of economy.

MUST HAVE FENDERS IN DETROIT.

The provisions of the city ordinance requiring that all motor vehicles used for service in Detroit, Mich., shall be equipped with a suitable fender are being enforced in that city, and the police are making complaints against the drivers and the owners of machines that do not meet with the requirements of the regulation. The probabilities are that the constitutionality of the ordinance will be carried to a higher court, or eventually to a determination. Aside from the cost of fenders, which is no inconsiderable item of expense, the experience thus far has been that the fenders are constantly being damaged and are not always operative when desired.

The Moody Compress Company, Galveston, Tex., has ordered from the General Motors Truck Company 10 electric trucks of six tons capacity, which will carry 25 bales of cotton each as a load. These machines are to be delivered as rapidly as possible.

The Federal Motor Truck Company, Detroit, Mich., now has as special representative Howard Wilcox, who was formerly president and general manager of the Standard Motor Truck Company, Detroit.

The Durable Dayton Truck Company has been organized at Dayton, O., with capital of \$25,000, by C. B. Foley, J. B. Ford and V. A. Troxell.

AMERICAN ELECTRIC CAR COMPANY.

Three Concerns Merged, with Capital of \$1,500,000, Plan Greater Activity.

The American Electric Car Company is the successor of Argo Electric Vehicle Company, Saginaw, Mich., Broc Electric Company, Cleveland, O., and Borland-Grannis Company, Chicago, Ill., these three concerns merging and determining plans for the unification of production and distribution, which is expected to result in material economy.

The Argo Electric Vehicle Company has been established for several years, with a factory and general offices at Saginaw, where both pleasure cars and wagons were built, the latter in a single type with capacities of 1000 and 2000 pounds. The machines have been generally distributed in the Middle West, where they have been regarded as satisfactory and dependable. A considerable number of its wagons are in service. The pleasure cars made by this firm are very numerous.

The Borland-Grannis company has built pleasure cars exclusively for several years, but recently a delivery wagon chassis with load capacity of 1000 pounds was designed, and this machine has been in experimental service. The results obtained have been very gratifying thus far and there has been understanding that within a comparatively short time these vehicles would be produced commercially.

The Broc Electric Company has built high grade electric pleasure cars in several designs for several years, there being a considerable number in service in Cleveland, O., and vicinity.

The officers of the American Electric Car Company are: President, F. A. Brand of the Broc Electric Company; vice presidents, Frederick Buck, Bruce Borland and U. B. Grannis; secretary-treasurer, Theodore Huss. The three concerns are now represented in the board of directors and the executive committee, and in addition to the assets of each concern, each financially sound, a considerable amount of new capital has been added. The purpose is to continue the manufacture of the cars without change of name and to market them through the regularly established agencies.

The reduction of overhead expense, the minimized expense of production in manufacturing and purchasing in larger quantities, the concentration of distributing endeavor, and the expansion of the market are expected to yield material return. Consolidation will make possible better and more careful exploitation of the service wagon field, in which large possibilities are expected.

At Hamilton, O., a company will build the new steel wheel invented by Thomas Sharp of Ludlow, Ky., which is adapted for use on service wagons. The wheel is a resilient type and is known by the name of Eureka.

LARGE TRUCKS FOR COAL HAULAGE.

Machines Productive for Even Short Hauls, If Worked Without Time Losses, for Capacity Loads, but Efficiency Lessens in Handling Family Orders.

OPERATING three five-ton, worm-driven Pierce-Arrow trucks, Olney & Payne Bros., the largest coal dealing firm in Pawtucket, R. I., after an experience with one machine for a year and a half, and with three for a year, has made conclusions as to the possibilities with motor equipment that are of decided interest to those who are engaged in the same trade. The trucks are used in combination with horse equipment and a comparison of cost has demonstrated facts that can be regarded as well founded, but, of course, the conditions must be understood and considered when these statements are applied.

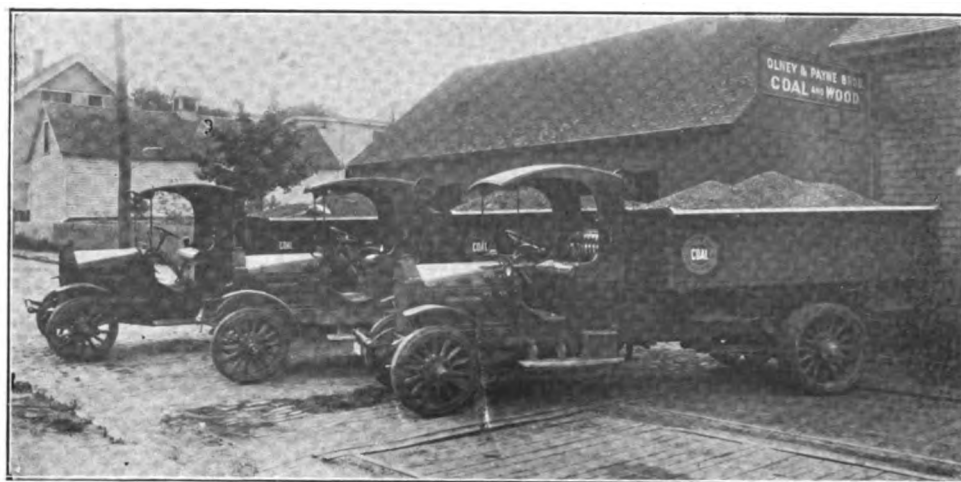
Concretely, the machines have been proven to be economical in comparatively short hauls where they can be worked to anything like their capacity, but when conditions are such that their efficiency cannot be fully realized the saving lessens so rapidly that there is much

does a general business that requires regular and occasional distribution. The normal area in which deliveries are made is within a radius of three miles.

The company has delivered fuel long distances, making hauls of 20 miles in some instances, but for orders of this kind the cost of haulage is figured and the sales cannot be regarded as being influenced so much by competition as by the need of the purchaser and the willingness of the firm to accommodate. Work of this character is so casual, however, that equipment could not be maintained for doing it.

The company receives coal in barges that are unloaded by special equipment, the anthracite fuel being stored in pockets on the pier, and the bituminous being usually piled beneath an elevated conveyor. The yard is on filled land perhaps six feet above tidewater and the loads must be hauled up short but rather steep

grades to the office, and from that point in practically every direction grades must be ascended, some of which are of considerable length. While not apparent this is a factor of considerable importance, for the loads carried by any vehicles, and especially with animals, must be determined with reference to the grades, for obviously either they must be lighter than where the hauls are on level ground, or more time must be taken for making them. The fact that the yard has never been well solidified because of the character of the



The Three Pierce-Arrow Trucks Used in the Haulage of Contract and Family Orders by Olney & Payne Bros., Coal Dealer, Pawtucket, R. I.

greater loss than would result with less expensive equipment. The company has equipment that facilitates practically the same economies with animal vehicles as with motor trucks, and the real factor is time, so that every minute of the working day has a value. The main purpose is to make every minute productive, and with power wagons the necessity is emphasized by the larger cost of equipment.

Delivery Conditions.

The company has contracts to supply several large works with coal, which means that a part of the transportation department is busy with these deliveries practically all of the time. Generally, these customers are willing to have fuel delivered at any time and would prefer to have a considerable supply in the yards rather than take a stated quantity daily and have little or no reserve. Besides this the company

old river bed—paving has not even given satisfactory surfacing—and for a considerable period of the year is soft and badly cut by the heavy carts and trucks, precludes excessive loading.

Acquiring the Equipment.

The company purchased the first Pierce-Arrow truck for delivery in September, 1912, and for this a special body was built equipped with a power hoist. This was used for haulage of coal to the J. & P. Coats, Ltd., plant, a distance of slightly more than 1.1 miles, the round trip being about 2.25 miles. The work done with this was so satisfactory that a second machine was ordered, and this was delivered in February, 1913, the morning of the second day of a strike of union drivers. The strike continued for three weeks and the company hired a third Pierce-Arrow truck, and a Packard three-ton truck, both of which were fitted

with standard platform bodies. In this emergency two sons of members of the firm drove two of the trucks. During this emergency the machines were used for all kinds of delivery, for economies were not considered, and a third Pierce-Arrow was ordered, this being delivered during the strike.

The company offered 50 of its horses and a number of carts for sale shortly after the strike was begun and disposed of a considerable number of animals and vehicles. The reduction of horses and carts was necessary and the trucks were utilized in contract coal haulage so far as possible, and this work was continued throughout the winter until the trade had reached its least demand. The gear power hoists were replaced by the standard Pierce-Arrow hydraulic hoisting equipment, the change being regarded as necessary. When the contract haulage was not sufficient to keep all three trucks busy family deliveries were made with them, and as the dumping bodies are not generally useful in this service the driver was given two additional helpers, making the crew of the truck four, for the purpose of handling the loads as quickly as possible.

Comparatively few residences are built so that fuel may be quickly unloaded, and despite the use of chutes, bags or baskets and double the number of men the experience has been that the machines cannot be worked so as to show a saving as compared with similar work done with animals, although it is practical with full loads and efficient operation to do haulage at approximately the cost with horses. In other words, the trucks will show economies even with short hauls in contract work, and may be worked as cheaply as horses when full loads are hauled in family delivery, but the value of the load is too small and the profit not sufficient to justify the machines where the orders are small and the conditions for delivery are such that service time is lost.

In making this statement the facts that the company regards the endurance of the truck quite as much as it does its time, that overloading is not tolerated, and that the drivers are not permitted to drive fast should be understood. Both overloading and careless operation mean deterioration of the tires and mechanism, and if the period of usefulness of the trucks can be extended the company will profit in like ratio. Viewed from the policy of the company the life of the machines must be realized to insure economy, and if they will endure for greater lengths of time there is a decidedly greater saving from their use. This is the reason that prompts the

policy. By this is meant that the company has purchased the vehicles with expectation of five years' service. If they will endure each for six years the company has what might be considered as the use of a single vehicle for three years at practically no expense other than operation and maintenance, the principal fixed charges, such as interest on investment, depreciation, etc., having been provided for. Then with this concern the principal factor in determination of economy is the period of service, and while the builder maintains 100,000 miles is the probable life, all in excess of this is evidently clear gain.

The actual determination cannot then be made until the degree of serviceability of the machines is known, and this means, until they have ceased to have usefulness, although from another viewpoint, by consistent maintenance the life may be continued indefinitely. Then, in a sense, the period of experiment must be over a period of years and results cannot be anticipated.

The trucks are examined and given ordinary attention by a mechanic who has had experience with all the pleasure cars owned by the members of the firm for a period of 10 years, and whose competency is certain, but all repairs are made at the service station of the agent for the machines. The experience of the firm has been that most of the attention the engine needs is cleaning and sufficient lubrication, and the best results are obtained from prohibiting changes and experiment by the drivers or others. Wear in the other parts of the chassis may be compensated by the usual means, but normal adjustments do not affect the operation of the machine materially.

Wear of the Worm.

Because of the lack of knowledge of the worm and gear wheel drive the rear axle of each truck has been carefully observed whenever renewal of the grease packing has been necessary, and the worms and gear wheels have been closely examined. No wear has been



Loading Two of the Trucks Under the Trestle of a Conveyor by Machines Driven by Electric Power, a Work Minimized by This Equipment.

noted when the worms or gear wheels have been measured by calipers, but both the worms and wheels have been extremely polished, the surfaces of the metals having been more closely consolidated or "worn in" by the contacting. The milling marks have not been obliterated. To determine the probable wear in another way the grease removed from the axle housing has been analyzed and the results have shown merely a trace of bronze or steel particles, the volume, even with the wear of the differential to be considered, being negligible. That the wear was so slight was extremely surprising.

The purpose of the company is to have the machines carefully overhauled at the end of the busy season, and until that is done the actual cost of operation can only be approximated, for the expense for each is to be averaged for the operating period, so that there will be an actual monthly charge for overhauling made against each machine. In the same way the tire expense is averaged, this affording a decidedly closer knowledge of the operation cost than if the charges were made whenever the tires were renewed.

Provision for Loading.

In the operation of the trucks the constant endeavor is to utilize time profitably. Grades of streets are considered and routes chosen for hauls in practically every direction. In the yards three loading machines, electrically operated, are used for both anthracite and bituminous coal and for both horse carts and the trucks. To show to what extent conditions influence efficiency, a change of route necessitated by railroad improvement has increased the haulage in a very large contract so that the number of deliveries a machine can make has been reduced from 11 to 10, despite the quick loading and dumping, and another factor of importance is the weighing, for the trucks are weighed every time they enter the customer's yard with a load and leave it empty, and the weight can only be taken with the engine stopped. Conditions of this character must be considered, and they all contribute to the cost of operation, and lessen the productiveness. Factors of seemingly little importance have material bearing on operation of trucks, for in the aggregate they may decidedly influence results. With less expensive units the effect is relatively smaller.

The company has not as yet experimented with smaller units in delivery, although there is probability that there may be a saving with them as compared with what is now in service. Horse equipment units can be added to meet a comparatively small increase in business, but a much larger demand is necessary to justify the addition of a truck, for it could not be made profitable without work, or the animals and carts must be sacrificed when it is acquired.

While the company believes that eventually motorized equipment will be used in delivery, experience is necessary to determine what forms and capacities are best adapted for the work, and so far as its horses are concerned these will be worked until no longer useful, as this appears to be the only manner of realiz-

ing the fullest measure of their value without sacrifice.

The average mileage of the trucks is approximately 50 each day, although as much as 75 miles have been driven to meet some especial condition. The tonnage is variable, but in some instances it has reached figures in excess of 75 tons, and has several times exceeded 100. But these are not the rule.

NEW YORK TRAFFIC REGULATION.

Aside from London there is no city in the world in which the traffic congestion is greater at times than in New York, and the worst conditions are experienced in the main streets of Manhattan, extending north and south, in which the blocks are seldom more than 200 feet in length, while in the streets extending east and west the blocks are often from 600 to 1000 feet. An ordinance has been proposed and is now pending before the committee on general welfare of the board of aldermen of that city, which provides that all vehicles moving through any street running east and west shall stop before crossing any street running north and south. Now the movement of traffic is subject to the direction of the traffic police, and patrolmen are stationed wherever conditions assumedly demand them, so that a vehicle need not stop while crossing the streets extending north and south unless ordered to do so. The claim is made that with the long blocks of the cross streets there is no possibility of congestion from delay, and the proposed regulation would entail closer and better observation of conditions where there is danger, both for pedestrians and for vehicular traffic.

WANT TRUCK CRANES.

Interested manufacturers can obtain from W. & A. McArthur, 18 Silk street, Cripplegate, London, E. C., England, specifications prepared by the harbor board, Auckland, New Zealand, which requires one and two-ton truck cranes, mounted on chassis having rubber tires, assumedly for use in loading and unloading freight at the piers in Auckland. This information is supplied by the bureau of foreign and domestic commerce of the national Department of Commerce, Washington, D. C., and further detail may be obtained from this bureau by referring to No. 12,511.

The Firestone Tire & Rubber Company has completed its service station at West End avenue and 63rd street, New York City, where facilities have been installed to serve all owners of motor wagons and trucks using Firestone tires.

A branch has been established at Los Angeles, Cal., by Phineas Jones & Co., of Newark, N. J., well known as a maker of wheels, which is known as Phineas Jones & Co. of California, and is managed by H. Percy Jones.

ELECTRIC VEHICLE PRACTISE.

Need for Systematic Attention to Insure Obtaining the Maximum Capacity of Storage Battery Cells and to Minimize Deteriorating Influences--The Value of Records in Making Comparisons of Work and Efficiency.

By William W. Scott.

EMPHASIS has been made of the care necessary in charging and discharging battery cells, and that the best results can be obtained by following a formula, this insuring that the attention shall be uniform and that nothing shall be neglected. This is not intended to imply that the expert or the experienced batteryman is not dependable, but is intended to impress upon the reader that the highest efficiency can only be insured by applying such methods that errors are not probable and desirable standards are always attained. Neither should one assume that complications are resultant from use of a formula. To the contrary, when methodical attention is given, conditions are observed that can often be dealt with so that there will be no serious loss of efficiency.

Experience has always a certain value when results are of record, but guessing is sure to lead one into situations that may be serious, for these may be anything from loss of service to material damage. Battery cells will endure a great deal of hard usage from an expert battery engineer, who is qualified by training to deal with conditions that may be anticipated and provided for, but the one who is less experienced will not understand operating possibilities and in attempting what may appear practical enough cause damage, or what is equally serious, impair efficiency.

Satisfactory equipment for charging is imperative, for without this one must be guided more or less by guessing, and this may lead to errors that would not be probable were there the ordinary means for the determination of exact conditions. The experienced batteryman will often improvise apparatus that will serve in the event of an emergency, but this can only be used with extreme care and with full knowledge of what conditions will arise and what protection should be utilized.

As a battery is composed of a series of cells, and each is a unit with reference to voltage and amperage, that there will be some variance in the normal indication is exceeding probable. Theoretically, with the

element of each of similar material and the electrolyte mixed to a given standard, the cells ought to be precisely alike in specific gravity and voltage, but practically there will be slight difference even when the greatest care is taken.

The reasons for this are obvious. The electrolyte may be slopped from the cells in different volume and the loss will have some effect. The degree of loss from evaporation will vary because the cells will not be equally protected. That is, some will be more susceptible to the atmospheric influences than others, the vents will not serve precisely the same and the degree of gassing will differ because of the condition of the

DATE RECHARGE TAKEN WITH FLOW OR DISCHARGE FOR AMP. INSPECTION A.C. A.M.P. MILES		- FRONT -				BATTERY NO. MAKE TYPE PLATES A.C. TEMP. BATTERYMAN	
		CRATE NO.	CRATE NO.	CRATE NO.	CRATE NO.		

Fig. 1. Form of Convenient Record for Inspection of Battery of 40 Cells, Showing Arrangement of the Crates in the Box.

electrodes. The effect of the gassing is to dissipate the water of the electrolyte in considerable quantity and to carry off a small proportion of the acid. In any one cycle of charge and discharge the loss of acid is practically negligible, but in continued operation there is necessarily a diminution, and so from time to time "equalization", or a restoration of the volume of acid, is necessary to bring the electrolyte to the required density. These probable causes of variance are aside from those that might have material effect, such as a leaky jar, a broken separator, or a condition of any character that might be regarded as abnormal.

The first essential is systematic inspection that will be sufficient to detect the height of the electrolyte in the cells, and that will entail removal of the plugs

from the covers, observation of the condition of each in turn, and if there is any doubt the depth above the element can be determined by a strip of hard rubber or a glass tube about a quarter inch with square ends. The rubber strip or the tube may be marked with the normal height and any material difference will be precisely indicated. Dropping the tube into the electrolyte and touching the element and placing a finger on the open end, a depth will be shown by the fluid retained in the tube when lifted. Either of these will require a reasonable light, and if done at night an inspection lamp is desirable, for then work can be done about the cells.

Inspection may be done at reasonable intervals, and while conditions will often suggest necessities to the experienced batteryman when nothing abnormal is noted, good judgment would demand regularity in this work. That inspections may have the fullest benefit a systematic record is desirable, and this can best be made on a card that can be filed. Such a card is shown at Fig. 1 and Fig. 2, the former being for the smaller and the latter for the larger types of batteries. The use of such a card means the recording of the battery manufacturer's number, or the owner's number, the make, the type, the number of plates and, if this is practical, the average temperature of the period to which the specific record refers. As will be understood the entries aside from the temperature are constants. Referring to Fig. 1 one notes that this is for a 40-cell battery, with four crates of 10 cells each installed longitudinally in the battery box, which crates ought to be numbered, the odd numbers on one side and the even on the other, this being a convenient method of insuring the same position when replacing after removal from the box, as well as minimizing handling, for the outer crates must be taken out to remove the inner. Fig. 2 shows a card designed for a 48-cell battery, this having six crates, each containing eight cells, installed transversely in the battery box. Any one crate may be withdrawn at either side without moving any of the others. The same system of numbering may be applied to this form of installation. Obviously the crates should be marked plainly, the longitudinal type on the side and the transverse type on the end.

Referring to these cards, one will understand that each square represents a cell, and when the crates are placed in a battery box in a given position the cells, if not shifted in the crates, will always be in the same place. The value of this is shown in the record, for by the inspection reports an analysis can be made from the history of any cell, and a condition traced accurately. This information is of material value to the batteryman. Obviously, to systematically handle the cells requires no longer time than to handle them without system, and the possibilities for obtaining satisfactory results are proportionately greater. To illustrate, when a cell is always in one place in a crate and the crate is always in a given position, specific observation is more certain than if changes were made. This

makes practical the keeping of the records as well. As will be noted, the cards show whether the readings were taken on charge or discharge, the flow of amperes, the age of the battery, the number of miles driven, with the date, the name of the inspector and his assistant. In the square representing the cell the readings are noted. Thus one card will serve for an entire battery for each inspection. Comparisons of the readings will indicate the condition of each cell at each inspection, and comparisons of the cards will demonstrate the variance evidenced by the inspections.

The daily or regular charging should be of record, and where the desire is to keep this singly, with a view of entering it in a sheet that will extend over a given period, such as a month, this may be a simple form of a size that is convenient to handle. This should include the date, the number of the vehicle, the number of the battery, the readings of the ampere-hour meter at the start and finish, the watt meter (if such is used) reading at start and finish, the watt meter number, the ampere-hours used, the kilowatt-hours used, the number of miles driven, the road conditions, the driver, and should be ruled so as to make possible the noting of the time, voltage and amperage for seven or eight hours. The form ought to show by whom the readings were taken and have space for the noting of conditions that might be observed. With such a form the readings may be taken hourly during charging and a reasonably satisfactory record made.

Where the form is to include a number of batteries charged from a single line, and without the watt meter record, the size may be such as will be convenient, with a series of 16 spaces ruled across the sheet for entering the time, and beneath each space a similar provision for entering the voltage and amperage. This will provide for half-hourly readings for eight hours. This can be used in combination with the form first stated and this will afford a very good record of any given charge. There are other desirable records, such as that which will show the readings of individual cells at half-hour intervals, or that which will show the readings of a battery by specific gravity progressively from a voltage of 76 to 119 and from an amperage of three to 46, the reading being taken from a pilot cell.

The reader may ask why mention of forms should be made in connection with charging, and the answer is to emphasize that records are absolutely necessary and should be provided for by the owner, that there should be no possibility of error or mistake.

The charging ought to be begun as early as is practical after a battery has been in use, for then less energy is required than when a period elapses, for the reason that the acid remaining in the pores of the electrodes is in a very dilute condition and the counter electromotive force is much less than it would be if time were allowed for diffusion so that the acid would be restored to its normal condition. If the battery has been used judiciously the discharge will have been stopped at a voltage that will approximate 1.8 a

when current is supplied at the eight-hour rate, at the one-hour rate the voltage a cell may be as low as 1.68, this because there is considerable residual capacity remaining in it. At the four-hour rate 1.75 is the safe terminal voltage.

Here it is well to emphasize that the requirements of a cell as to specific gravity of electrolyte, of voltage, of amperage when charging should be carefully followed. It is not practical or even possible to apply a single rule for charging and discharging, because the cells are made to produce specific results in stated conditions, and these are usually determined from extremely careful tests. There are variables, such as temperature and age, which cannot be anticipated and which influence battery efficiency. One might assume that with increased density of electrolyte the greater would be the capacity in any case, but a maximum capacity exists that has been carefully ascertained, and to go beyond this will diminish the capacity of the cell. This characteristic is more pronounced with the negative plates than the positive.

The nearer the period of time required for charging approaches that of discharging the more satisfactory is the efficiency of the cell. The virtual efficiency increases the voltage during charging, as this must be borne in mind, and the result is a higher energy. When the charging rate is rapid, the action of the electrodes is hindered and the diffusion is not complete, the voltage of the cell is lower because of the high concentration of acid in the cells, the plates, which can cause the acid to flow freely into the solution in such a condition such as this

a higher charging rate and energy required

is as compared with the amount actually required. It is this lost energy that develops as a characteristic of all lead-acid batteries.

When a battery is charged rapidly the temperature reaches a higher temperature than would result from the internal resistance of the charging at lower rates.

In connection with battery charging there are several factors that should be considered. One of these is the rate of current, the second is the efficiency of the charging, and the third is the endurance of the cells. These are of substantial importance, and are influenced by charging. These have direct bearing on the cost of battery operation and maintenance, on the service and the mileage that can be secured.

With this, careful attention to charging means that the work that would otherwise be necessary for normal operation. That is, a battery charged properly and with regard for conditions can be expected to last to a much greater extent than can one

that is not so well cared for. The battery that is charged and discharged nearest to the rated standard will require minimum current, which is a direct cause for expense; it will give the maximum mileage, which represents the greatest service for the cost of current, and the deterioration will be insured against so far as this can be done.

When a cell is not charged for an unnecessary period following discharge the sulphation of the electrodes, which was a necessary result from discharging, is continued until charging is again begun, and when it is charged a greater number of amperes of current at a higher voltage must be passed through the cell to bring it to its maximum capacity than would be necessary than if the charging were begun immediately after discharge. The increased current necessarily means value; it means an increased expenditure without added return, and where excessive heating results the probabilities of internal discharge and consequent further loss of energy are much greater. Not

BATTERY No.		Type		Plate		Ave Temp.		BATTERYMAN	
OWNER		CRATE No.		CRATE No.		CRATE No.		CRATE No.	
LEFT		REAR		FRONT		RIGHT		DATE	
INSPECTOR		With Flow		Ass		Miles		Reading Taken	
On Discharge		for		Ass					

Fig. 2. Card Prepared for Inspector's Report on Battery of 48 Cells, This Being for a Different Crate Installation.

only this, the positive plates are corroded unnecessarily and there is diminished efficiency and a loss of service, for the cell has a specific life.

The theory of charging is simple enough. With a line voltage that is not in excess of the required maximum voltage of the battery the charging connection may be made and the current permitted to flow at the amperage prescribed by the maker of the cells without any further attention. When the cells begin to liberate gas freely the amperage should be reduced to the specified rate and the gassing will diminish, and the current should be continued until there is no further increase in voltage for a period of perhaps a half hour. When this condition has been reached the voltage of the battery very closely approximates the line voltage, and were there material diminution of the line current the battery pressure would reverse the current and it would then flow from the battery through the line.

The fact that indicating instruments are used is to insure certainty and to protect against such results as might obtain from inability to judge correctly. The records provide the means of making comparisons that conditions may be determined accurately. With these a known current can be supplied, and the condition of the cells so far as voltage is concerned can be ascertained without recourse to observation, and where a considerable number of batteries are in use this is a distinct saving in time.

With reference to the instruments, the watt meter will show the precise current used, and this may be desirable as a check on current cost. The voltmeter and the ammeter are necessary that indications may be noted at any time, and with these included in the charging outfit the conditions may be known. For convenience these instruments are included in a single assemblage, these, with the necessary switches being installed on what is known as a switchboard or charging panel. The rheostat or resistance coil is sometimes included with, or it may be separate from, the panel, this being largely determined by the space that is available. For economizing space the charging panels are built to afford as many as six battery circuits, and these may be used as units to make up a switchboard of any desired proportions.

With instruments the voltage at the start of the charge can be determined, and the amperage of the current will be shown, and taking the standards established by the manufacturer the charging can be done at a rate that will insure the greatest efficiency.

What has been stated applies to batteries that have been practically discharged, for no battery should be charged unless its capacity has been reduced at least 50 per cent., or it is to remain unused for several days. Assuming that a battery has been discharged 60 per cent. and charging is to be made: When the battery is connected the voltage will be indicated on the voltmeter, provided that this is not shown by an ampere-hour meter connected with the battery in the vehicle. The approximate required voltage is known in any event. With this indication the amperage is fixed at the starting rate, which is standard for any number of cells of any given type and make, and this should be continued until the condition of free gassing obtains, which, in the instance cited, would be approximately three hours; or the current can be supplied at the starting rate for three hours, and then the amperage reduced to the finishing rate and continued for an hour and a half or two hours, or until the maximum voltage has been obtained.

In the event of the battery being discharged but 40 per cent. the same method should be followed, but the current at the starting rate will be needed for perhaps an hour and a half, and the finishing rate will be supplied until the maximum voltage is indicated. If the battery is but 20 per cent. discharged the charging can be begun at the starting rate and continued until gassing is begun, which will be within a comparatively short time, and completed at the finishing rate. But

in the estimate of the current that is needed to charge a battery 10 per cent. can be safely added to the indication needed. That is, if the current required is 80 ampere-hours, practically 88 ampere-hours, possibly 90, will be necessary, as from five to 15 per cent. more charge is needed than has been discharged from the battery.

The short periods of charging required when a battery is to be idle for a short time can be made at slow rates, and usually the slower the better, for there is less stress upon the electrodes and no purpose is served by hastening the charge. Assuming that the battery has been used intermittently during a day and the current much reduced: The period of charging can be taken as seven hours approximately. When charging is begun the record should show the time to start, the voltage and amperage, and each hour a similar record should be entered, until the battery is disconnected. Half-hourly readings will give twice the supervision and consequently a better knowledge of the time when the amperage should be reduced, for continuation of gassing means waste and the consequent deterioration.

The time for discontinuing the charge is important, for continuing a charge unnecessarily serves no useful purpose. The period the battery has been in service, the temperature and the condition of the electrolyte will have considerable influence, and for that reason no arbitrary voltage can be fixed, and maximum voltage can be best determined by two conditions—when with the reduced amperage the cells gas freely, and the voltage does not increase for a period of a half hour. While the voltage will rise steadily with the flow of the starting rate of current, when the amperage is reduced and gassing is materially decreased there will be a slight drop, and then the voltage will begin to increase until there is a second period of gas liberation and the voltage will remain stationary.

Another method of charging, which is very strongly commended by those who have had experience with it, is known as the "gravity" system, in which readings of the specific gravity of the battery are the entire record. With this the only indicator is an ammeter, which is connected in the line in the usual manner with a switch. One of the cells in a central group (never an end or outer cell) is selected as a pilot, and before charging the specific gravity reading is taken. A tabulation of specific gravities at varying voltages of the battery from minimum to maximum is made for convenient reference and this can be corrected for temperature if desired by the application of the rule of one point decrease in density for every three degrees rise in temperature, and one point increase in density for every three points drop in temperature. If the temperature of the place of charging does not vary materially so much the better. After finding the initial reading of the pilot cell, and the taking of the temperature and the correction for the condition, the battery is placed in circuit. Specific gravity readings are taken at half-hour intervals and record made. When the cell

begins to gas freely the amperage is reduced as with the other method, and the current continued at reduced rate until the cell again liberates gas and the voltage does not rise. With the gravity method of charging the condition of the battery is absolutely known and it is not influenced by any factor.

With the use of the charging plug and receptacle the connection made with the battery cannot be otherwise than correct, provided the terminal connections have not been confused, but in such an event the voltage indication would show a drop instead of an increase directly after, and in such an event the charge should be interrupted and the terminal connections reversed. With reference to battery temperature, the heating has been shown to be a material influence, and should excessive heat be indicated the charge should be stopped and the battery allowed to cool. In no instance should the temperature exceed 110 degrees Fahrenheit during charging, and in operation 100 degrees is the maximum permitted, but these points are where danger of damage is imminent and a much lower indication should be much safer.

(To Be Continued.)

CO-OPERATIVE PROMOTION.

An admirable example of co-operative promotion was brought to the attention of the people of New York City during the succession of blizzards in February, when the different companies engaged in selling electric trucks and delivery wagons in that municipality united and published a series of advertisements in the daily papers in which the results obtained from electric machines in the severe conditions were stated. The advertising was not intended to directly benefit any particular concern, but each interest was given prominence, the purpose being to bring to the attention of those engaged in transportation the possibilities with electric vehicles.

The different firms of Kansas City, Mo., have similarly united in the publication of advertising, with the intention of promoting the general use of motorized equipment and informing those engaging in transportation service, or requiring it, that "there is a truck suited to your purposes" and leaving the field open to all.

In promotion of this kind, instead of condemnation of machinery by competitors, each is constrained to speak of all other vehicles in a manner that impels confidence and will develop interest and eventual purchasing, instead of destroying it by so-called criticism and selling argument, which might prove destructive.

ADAMS PASSENGER OMNIBUS.

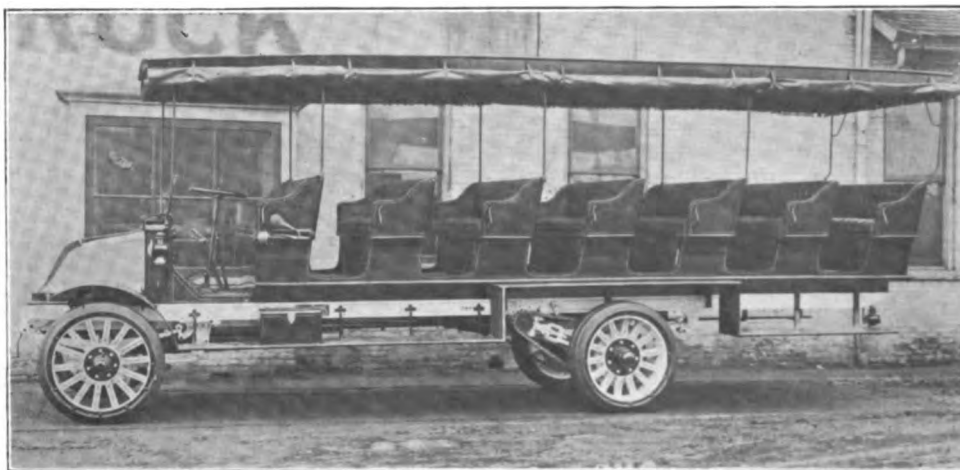
Seven-Seat Body with Canopy Top, Installed on Two-Ton Truck Chassis.

The Adams Bros. Company, Findlay, O., has recently produced a passenger omnibus that is intended to have all the utility of such a vehicle with the lightest and most practical body that could be used in such service. The machine is a model E two-ton chassis with a wheelbase of 160 inches, this being a special length to insure the desired stability.

On this chassis is installed a body with a substantial floor frame and floor on which is built seven seats with substantial backs and arms, each accommodating four persons, so the vehicle will carry 28 persons including the driver. The seats are spaced sufficiently so as to afford ease of movement of the passengers in entering or leaving, and seat, back and arm upholstery is substantial leather, this being well sprung to afford comfort.

At either side are running boards that are dropped between and back of the rear wheels and are practically at the height of the frame above the rear wheels, so that the three forward and the two rear seats are entered from the low running boards, and the other two from the high. The arrangement is extremely convenient.

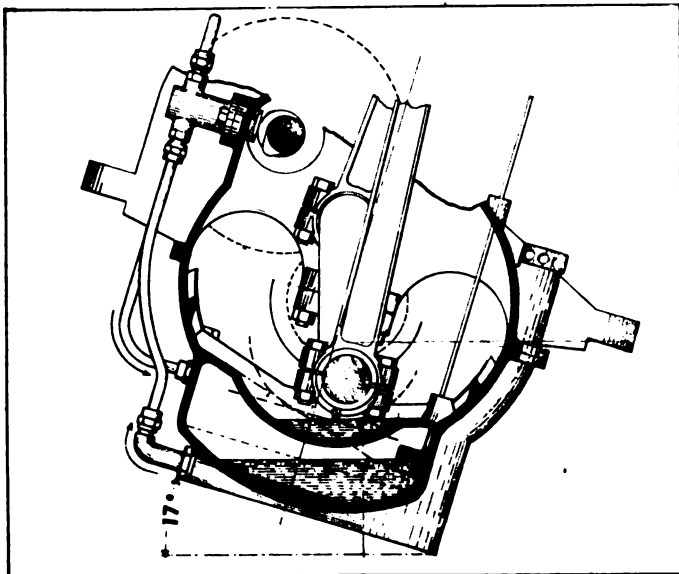
The roof is a canopy type, being considerably wider than the seats, extending from the line of the dash back with a considerable overhang of the rear seat, and is supported on 10 steel stanchions, five at either side. This insures the fullest degree of vision for the passengers and protects them from the sun, and in the event of storm the occupants can be sheltered by ample curtains that may be dropped at the sides and ends. Handles at the sides of the seats convenience the passengers when entering or leaving the seats. The machine is driven from the left side and the control levers are located in the centre of the floorboard, as will be noted in accompanying illustration.



Adams Model E Two-Ton Truck Chassis, 160 Inches Wheelbase, Equipped with a Seven-Seat, 28-Passenger Body and Standing Canopy.

WHITE SYSTEM OF MOTOR LUBRICATION.

THE White system of motor lubrication, the invention of Ernest M. White, a consulting engineer of Globe, Ariz., who is now located in Detroit, Mich.,



Transverse Section of Motor with White Oiling System at Angle of 17 Degrees, Showing Oil in Reservoir and Crank Pits, and the Location of the Drainage Channels at the Sides.

has been recently brought to the attention of automobile motor engineers, who have manifested much interest in it. The system is a construction of the crankcase internally so as to provide for a progressive feed of the lubricant to each of the big ends of the connecting rods so that the splash flowage will be uniform in every condition in which the engine is used. As the statement would indicate, this is an application of splash lubrication.

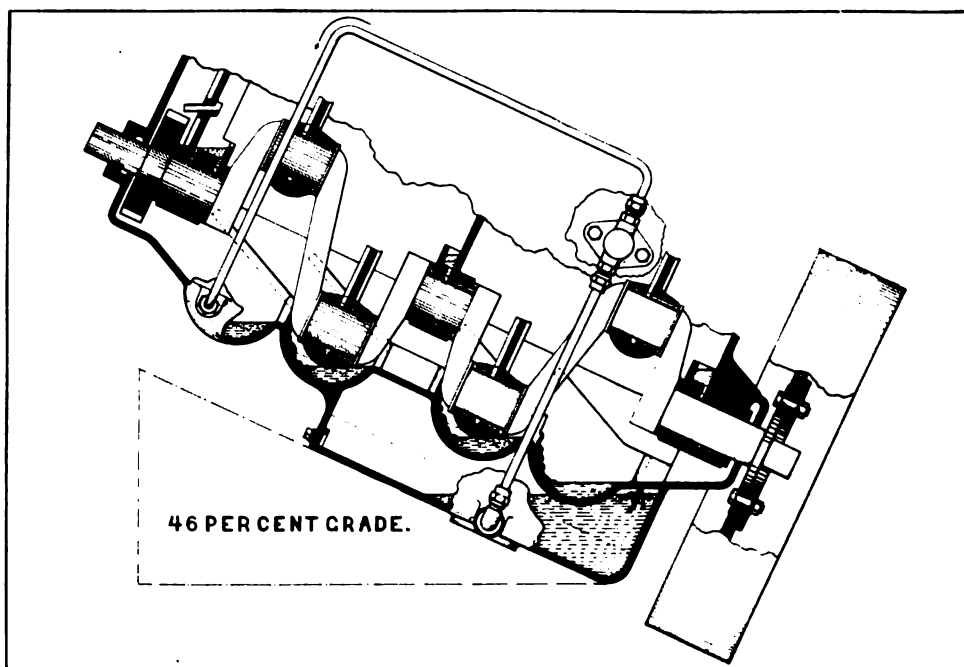
The majority of motors in use today are lubricated by a distribution of oil internally in the engine, this method being regarded by most engineers as being satisfactorily efficient, and is applied because conditions generally establish its practicability. The ease of construction, simplicity and the certainty of operation are also factors that have impelled engineers to utilize this method, although some have adapted combinations which are regarded as productive of specific results.

Motor lubrication is dependent upon varying conditions and each moving part ought to be supplied a sufficient volume of oil to meet every requirement, this with reference to temperature, speed and quantity of lubri-

cant contained in the supply, these factors being of decided importance, for the main, crankpin, wrist-pin, camshaft and timing gear bearings, the piston and cylinder walls and the valve tappets and guides, as well as the timing gear faces and the valve cams, must be oiled.

It is evident that an excess of lubricant will not be a reason for objection unless there is an accumulation in the combustion heads of the cylinders, but a volume insufficient will quickly result in damage, and the necessity of supplying the forward portion of the motor when ascending a grade and the engine is worked the hardest has impelled the combination of a mechanical feed that will insure a supply being carried to the timing gears and forward main bearing.

The splash system is primarily the dipping of the big ends of the connecting rods into pits or gutters made transversely in the web, forming the bottom of the crankcase in which oil is collected as it drains from the walls of the case. As the motor heats the fluidity of the lubricant is increased and it flows more rapidly, but the need of the engine is greater and the distribution is faster. As the volume of oil lessens the quantity available for hard or fast work is consequently diminished, and while there might have been excess for slow operation there is not sufficient for continued use at fast speed. If the source of supply is variable with the position of the engine, with reference to the grade, mechanical feed is expected to furnish oil to those parts where the least quantity is supplied. Theoretically, the rapid revolution of the connecting rods is supposed to create a mist of oil in the crank chamber, and this should be distributed by centrifugal force. It will be understood that considerable depends



Longitudinal Section of Motor with White Oiling System at Angle of 25 Degrees, Showing Form of Crank Pits and Their Retention of Oil, the Dotted Line Indicating Bottoms of Drainage Channels.

upon the state of the fluidity of the lubricant.

The claim is made for the White system that the volume of oil splashed from the oil pits about the engine case is the same for all motor speeds, no matter whether the motor be level or placed at an inclination of 25 degrees above or below the horizontal, which is equivalent to ascending or descending a 46 per cent. grade. It will be understood that this is a gradient that is extreme, for operation in a condition that would equal this would not be regarded as practical by any experienced motor operator.

The specific value of the system is that it insures a constant supply of oil at all times, whereas in other methods of lubrication the oil is concentrated at varying places in the pits or pools and not where the fullest supply is afforded to the scoops attached to the big ends of the connecting rods. When baffle walls or separate troughs are provided the quantity in each may vary considerably, some of the cylinders being "starved" and others flooded when the grades are extreme. Operation in such conditions may result in serious damage to a motor.

The White oiling system is shown in a sketch of a longitudinal section of a crankcase and illustrates the peculiar form of the splash troughs and the "dippers" on the connecting rods, as well as the oil level in the troughs when the motor is inclined, as when climbing a gradient equivalent to 46 per cent. This indicates the possibilities in circumstances that would probably never be reached. This sketch assumes that the surface is level transversely, but the other shows a transverse section and the surface of the oil in the pits with the motor inclined 17 degrees. From these two one will gain a very clear idea of the manner in which the oil is concentrated and retained where it can always be utilized.

The oil may be contained in any convenient form of reservoir attached to the base of the crankcase, from which it may be drawn by any suitable type of pump, fed through a sight feed if desired, and then delivered, either over the timing gears or to the splash trough for the front or No. 1 cylinder. As will be noted, on the side walls of the crankcase are grooves or channels that are sufficiently inclined to insure a flow of the oil drained from the walls toward the rear of each of the oil pits or troughs, but draining into the trough behind.

Examining the second sketch one will see that the oil carried forward by the pump is drained into No. 1 trough. Here it is splashed transversely across the case and distributed centrifugally, and after lubricating this section and the working parts the drainage is collected in the side channels and carried to No. 2 trough. The operation is repeated to the last trough, and the drainage from this is into the oil reservoir. The pump is adjusted to give a stated quantity each revolution, and thus the drainage is collected progressively and an equal volume of oil supplied each trough, no matter what the number of cylinders. Each trough is abundantly provided for, and no one will receive

more than another, for the movement of the oil is specifically directed. The flow of oil from the front splash trough to the rear of the motors is illustrated, the oil being represented by what might be mistaken for wicks.

The inventor claims that besides definite efficiency the simplicity and low cost are material factors. When installed when a motor is built the cost is no greater than that of the simplest system, using a pump or the flywheel to lift the oil from the oil sump to the splash troughs. The uniform distribution of lubricants under all operating conditions is maintained to be especially desirable for practically every form of motor used for motor vehicles, motor yacht or aeronautical purposes. The inventor maintains that the system has been thoroughly tested on long and heavy grades in the mountains of Arizona, being installed in four and six-cylinder motors of different makes, and that the efficiency and uniformity of the lubrication gave marked increase of mileage to the gallon of fuel, no smoke was exhausted and the motors ran cool and had as much power at the top of a long grade as when the start was made.

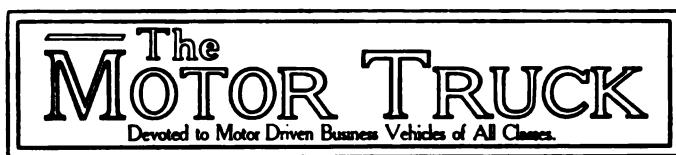
CREDITORS GIVE AVERY COMPANY TIME.

The Avery Company, Peoria, Ill., which has been financially embarrassed because of lack of ready money, will continue through an arrangement by which the creditors have approved the extension of credit for a year, with the privilege of renewal of extension for a similar period if this should be necessary. The inquiry into the affairs of the company showed that it had assets of approximately \$6,000,000 and liabilities of about \$2,200,000, and there was Dec. 31, 1913, an excess of \$1,909,737 in quick assets over current liabilities. The company will issue notes to the amount of \$2,000,000, bearing interest at six per cent.

M. A. M. NEW MEMBERS.

The Motor & Accessory Manufacturers, Inc., at the last meeting of that organization admitted the following concerns to membership in the association: Michigan Steel Castings Company, Detroit, Mich., maker of steel castings; the New Haven Clock Company, New Haven, Conn., maker of motor vehicle clocks, and the Standard Tool Company, Cleveland, O., maker of lathe and hand tools.

Following the appointment of J. F. Task as special representative of the truck tire department of the Firestone Tire & Rubber Company, P. J. Talbott, manager of the Firestone branch at Dallas, Tex., was transferred to Cleveland, H. W. McFadden of Houston, Tex., was transferred to Dallas, and G. C. Falling, a sales representative in Texas, was placed in charge of the Houston branch.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

THE BOSTON MOTOR TRUCK SHOW.

Those who are in any way concerned in the use of highway vehicles for transportation can profitably devote one or more days to the exhibition of wagons and trucks that will be made in Boston, March 17-21 inclusive, for this will be the largest and most comprehensive display ever made in America. This statement is made advisedly, for with a realization that the attention of business men concentrated on securing machines that are in every way suited to requirements, and are ready to buy if satisfactory types can be obtained, the exhibitors have gone to extremes to display the latest and most highly perfected constructions.

While the show will include all sizes of machines, many builders have produced smaller and lighter sizes than in previous years, believing that there are large possibilities in supplying the needs of those who want faster transportation of lighter loads. That is, the demand for vehicles that have capacity of 1000 to 1500 pounds, which can take the place of the single animal wagon, will be such as to justify the production of light machines in larger numbers.

The exhibition will be attractive because of the development of the vehicles regarded as standards, to say nothing of the new types that will be shown for the first time, and there will be many chassis exhibited with special equipment developed for use in conditions where standard bodies would not be economical. The show will continue five days and during its contin-

uance a considerable number of business organizations will visit it for the purpose of investigating the possibilities with reference to special business needs. The show is expected to attract a large number of transportation experts, whose knowledge of vehicles is very essential, and who will study the type to ascertain the possibilities for differing work.

SCHOOLS FOR VEHICLE DRIVERS.

The owners of motor trucks and wagons are vitally interested in the subject of drivers, for the experience with men who have driven pleasure cars is that they believe if they operate the machine they are earning their money. With rare exceptions the best men are those who were drivers of animals, who take their added responsibilities as direct promotion, who do not become speed maniacs, who willingly work loading and unloading, who drive carefully, and who do not attempt to improve operation by making adjustments to meet their own ideas.

The human element that the owner has to deal with is usually the worst and most exasperating of any problem he has to meet. Assumedly, any man can drive a horse, but the average horse owner is decidedly better satisfied with the man who is trained to his business. The man who is willing to entrust a valuable machine to a man whom he knows little or nothing of would hardly consider a proposal to let this same man drive a valuable animal. Yet the motor equipment is condemned because it is overloaded, driven to excessive speed and "adjusted" by one who has no practical knowledge. There is no doubt that a majority of owners are directly responsible for the failure to obtain satisfactory results. Hiring men trained and recommended by the manufacturers has its advantages, but training responsible men for the exact work they are to do is decidedly better.

WHERE THE MOTOR IS ECONOMICAL.

The majority of business men owning transportation equipment can, by even casual analysis of work accomplished and conditions of service, determine where a motor vehicle can be used advantageously, and frequently the saving can be traced to other vehicles. This statement appears paradoxical, but when one understands that while the work with motor equipment may not in itself be less expensive, the time of men and other vehicles can be largely economized, the application is not in any way erroneous. Numerous instances have come to the attention of the writer recently in which the actual economy of the motorized vehicles was not in itself a large factor, but with them possibilities with other equipment was decidedly important. The thought suggested is that the adaptation of motor wagons and trucks does not necessarily mean a complete change of vehicles, but the utilization of machines where they will be advantageous.

SHOWS ECONOMY IN STREET GRADING WORK.

Analysis of Figures Submitted in Annual Report Indicate Truck Is Operating at a Saving of \$6.25 a Day---Other Late News Respecting Municipal Service Equipment.

WITH a total outlay of \$4875 for a motor truck equipped with steel body and power dumping apparatus, the street department in Montpelier, Vt., is enabled to effect a saving of \$6.75 a day, based upon the cost figures submitted to Mayor James B. Estee in the annual report, in comparison with similar work in which the state co-operated with the city.

The truck has been in service practically three months, during which time it has been employed in hauling gravel from the Winooski river, a round trip distance of approximately five miles. In its first job, which occupied one month, according to the figures of the street department, the machine effected a saving of \$384.82. However, in this computation only a partial list of the items chargeable to the truck were included, as follows: Salary of driver, \$79; gasoline, \$76.39; gravel, \$50.40; labor and team in scraping river for gravel, \$229.29; a total of \$435.08. This total was compared with the cost of a similar piece of work done with state co-operation, which was \$819.90. The detailed figures for the three months follow:

Three Months' Figures from Annual Report.

License	\$20.00
Liability insurance	49.00
Fire insurance	6.80
Driver's salary	294.00
Gasoline	205.74
Oil and grease	30.00
Repairs	87.90
Tires	90.60
Express paid on wheels to and from factory.....	40.92
Total.....	\$824.96

In connection with these figures the item of tires is explained by the fact that wider rear tires were found to be necessary, and the figure given represents the difference in cost, less allowance on the old tires. It also will be noted that the statement of cost provides for no overhead. It is assumed that the machine was stored in the city yard, and being a municipi-

pal machine it is possible that no tax allowance is considered necessary. It hardly will be denied, however, that some percentage should be included for depreciation. Assuming that this is figured at 20 per cent. the result is \$85.42 for the three months, and, making a proper allowance for the items of license and insurance, which must be considered as annual expense, the machine has been operated at a cost approximating \$13.25 a day.

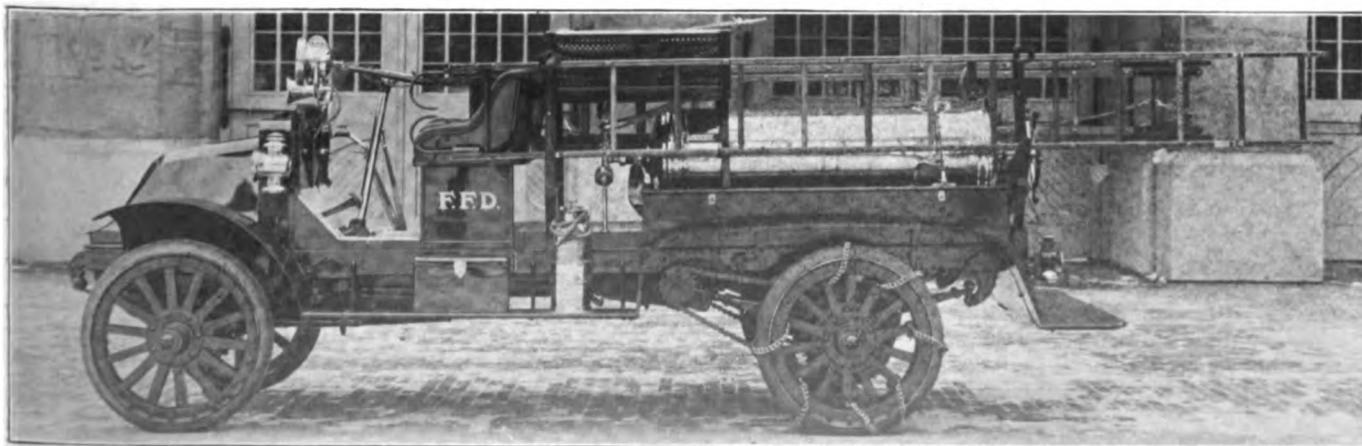
How Saving Is Computed.

The teaming expense in connection with the state work to which reference has been made was \$20 a day, thus indicating a saving of \$6.75. Obviously, these figures will need readjustment in the future, since it will not again be necessary to ship wheels to the factory for fitting new tires. The item of repairs is explained by the fact that when the machine was first placed in commission, the driver met with "a little bad luck".

While detailed consideration of the figures submitted would indicate a discrepancy of \$90.90 between the saving of \$6.75 a day, and that of \$384.61 on the first job, of one month's duration, this may be accounted for in several ways. The fact that the truck was enabled to cover a greater distance in a day, may have been responsible for considerable reduction in the price of material, for instance. It is also pointed out in the report that, with a loading device at the river, much additional time could be saved, and the efficiency of the machine greatly improved.

UTILIZE ADAMS CHASSIS.

An accompanying illustration serves to offer a suggestion which may prove of decided interest to other cities. The photograph reproduced is that of an



Adams 1.5-Ton Chassis Recently Delivered to Central Fire Department of Findlay, O., and Fitted with Body by Members of the Department.

Adams 1.5-ton chassis, made by the Adams Bros. Company, Findlay, O., to which the members of the fire department in that city were able to fit their old equipment so as to give them an up-to-date piece of fire apparatus at a comparatively small outlay.

It will be noted that the chemical engine was arranged lengthwise of the body back of the driver's seat, and above the forward end of this was placed the wire basket for the chemical hose. Provision was made at either side of the wagon for carrying ladders, hand extinguishers, etc. Seats with hinged covers also permit of storing axes and other fire fighting paraphernalia.

The chassis is standard in every respect, except that of speed, being geared to run 30 miles an hour. The motor is a four-cylinder, water-cooled unit of the L head type, with bore of 4.125 inches and stroke of 5.25, this giving a rating of 27.25 horsepower under the S. A. E. formula, although it is rated by the maker at 35. Ignition is by Eisemann magneto with automatic advance. The clutch is a dry disc construction, and the selective sliding gearset affords three speeds forward and reverse. The wheelbase is 136 inches. A distinctive Adams feature lies in the use of a radiator directly in front of the dash, and a sloping hood.

HANDSOME INVALID COACH.

Accompanying illustrations present a handsome invalid coach, or ambulance, recently produced for a client of the Overland-Garford Sales Company, 6604-18 Euclid avenue, Cleveland, O., by the Willys-Overland Company in the old Gramm Motor Truck Company's plant in Lima, O. The chassis is that of the Willys Utility wagon of 1500 pounds capacity, but the body work is of special design, and since it is somewhat more elaborate than that of the ordinary ambu-

lance the term invalid coach appears to be more fitting.

The compartment shown in the smaller of the two illustrations is located back of the driver's seat, and entrance to it is by large double doors at the rear, or by a single door at the side, opposite the cot, and between the two attendants' chairs. It will be noted that the cot and chairs have been designed and constructed with an idea of providing the utmost comfort for the occupants. The other appointments include provision for running water, water cooler, wash basin, electric fan, hot air heat, medicine cabinet, stretchers, sashless drop windows, etc.

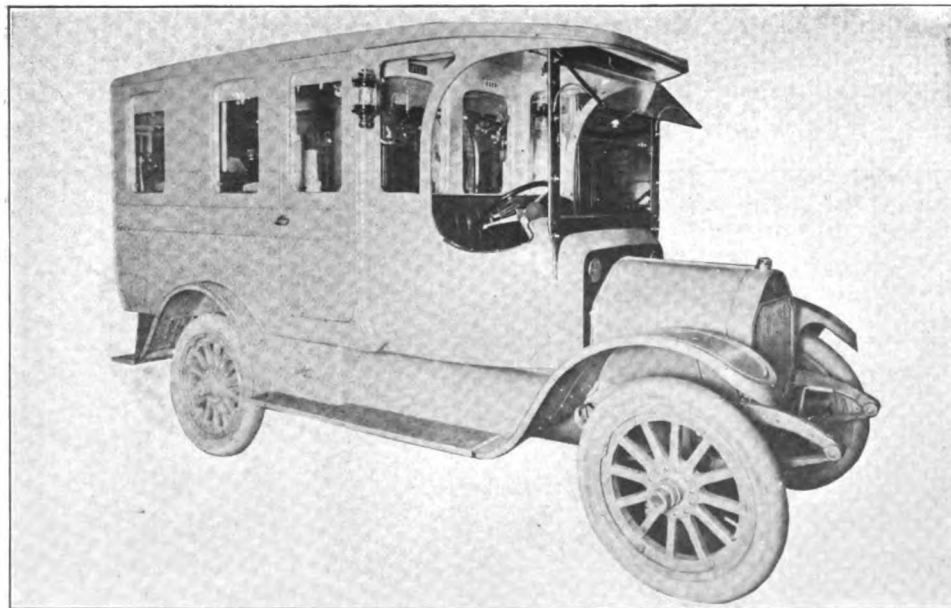
The chassis is equipped with a four-cylinder motor, with cylinders cast singly, the bore being four inches and stroke, 4.5. This gives a horsepower rating of 25.60 under the S. A. E. formula, but the maker claims it will develop 30 at normal speed. Cooling is by thermo-syphon, ignition by Remy magneto, and lubrication by a self-contained pressure feed system. The clutch is a cone, leather faced, and the selective sliding gear transmission affords three forward speeds and reverse. Brakes are external contracting on the jackshaft, operated by pedal, and internal expanding on the rear wheel drums, actuated by lever. Springs are semi-elliptic, the front members being 45 inches long by 2.25 wide, and the rear, 50 inches long by 2.5 wide. The front axle is an I beam section and the rear, a rectangular section, both utilizing Timken bearings. The standard wheelbase is 120 inches, and the tires, 36 by 3.5 inches.

KNOX CARS IN PITTSBURG.

Former Chief William Coates of the fire department in Pittsburg, Penn., declares that that city is one of the hardest in the United States for fire apparatus, because of its steep hills on which the residential sections are built. He believes that any motor driven apparatus which will withstand the hard conditions thus imposed upon them can be operated successfully anywhere.

The Pittsburg department purchased its first automobile equipment, a Knox combination wagon, made by the Knox Automobile Company, Springfield, Mass., in February, 1912. After noting its successful operation under these adverse conditions, three more were placed in service the following September. These have been followed by six more of the same type during the past few months.

The city now has 16 motor driven vehicles of all



Handsomely Appointed Invalid Coach Body, Fitted to Willys Utility Chassis, Indicating Entrance to Interior at the Side.

types, with more coming. One of these, No. 5, has been stationed at the busiest engine house in the city, and has answered 300 alarms without a single failure due to any fault of the car. In fact, it is stated that none of these 10 combination wagons, or of the five Knox-Martin tractors, which are attached to hook and ladder trucks, has failed to reach a fire, except in one or two instances where the carelessness of the driver caused a slight accident.

In connection with these machines, former Chief Coates says: "It is astonishing what these motor driven cars can withstand in the way of accidents without receiving serious injury, and our experience proves that motor driven apparatus must be of the most substantial construction to secure thorough reliability."

NEWS FROM VARIOUS CITIES.

Appropriation for Entertainment—The city council of Portland, Ore., has appropriated \$5500 for the purchase of an automobile to be used by the mayor and members of the council in escorting distinguished visitors about the city.

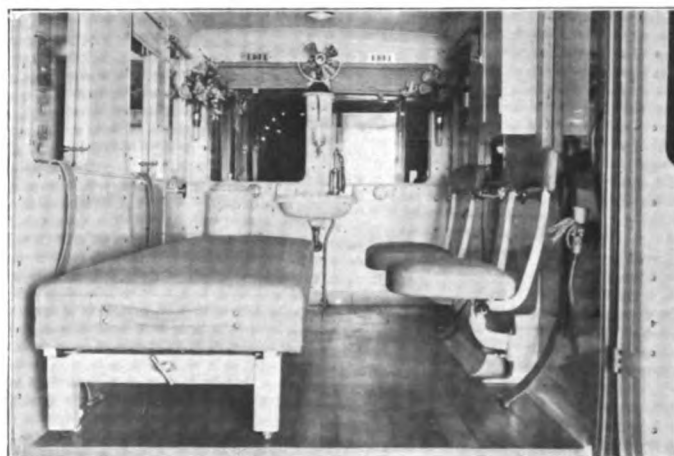
Apparatus Lowers Insurance Rates—Because the town of Middleboro, Mass., installed motor apparatus and a reduction of insurance rates resulted, the people of Bridgewater are seriously considering emulation of the example set by the neighboring town.

Mail Cars for Boston—Congressman Roberts has called the attention of the postmaster-general to the need for a more rapid method of conveying mails in the city of Boston. He was moved to take this action because of the success attained by the use of motor vehicles in other large cities.

Recommends Complete Motorization—Chief Fancher of the fire department in New Haven, Conn., has joined the ranks of those who favor the complete motorization of the fire fighting apparatus. In his annual report he suggests that the fire loss of \$191,540 during 1913 could have been materially reduced by the use of automobile equipment.

Advises Purchase of Tractors—After having devoted considerable time to investigating the use of tractors for hauling fire apparatus in other cities, Mayor P. L. Cofran of Topeka, Kan., has advised the adoption of motor tractors to the total exclusion of horses in the local fire department. It is probable that several of these machines will be purchased during the coming year.

Reduced Cost with Truck—David A. Hartwell, chief engineer of the sewage disposal system and superintendent of sewers in Fitchburg, Mass., states that one-half of the expense of cleaning the city's



Interior of Willlys Utility Invalid Coach, Showing Attractive Arrangement of Interior Fittings.

catch basins must be credited to teaming, and he raises the point in his annual report as to whether or not this expense could be reduced to a more reasonable basis by the use of a motor truck.

White Truck Is Economical—Commissioner Campbell of the water department in Lynn, Mass., states that the use of the new White truck, made by the White Company, Cleveland, O., and trailers, in handling 36-inch pipe in that city has effected a decided saving over horses. The truck is able to make four trips a day, as compared with two with horses. Two trailers are utilized, one being loaded at the wharf, while the other is being hauled to its destination and unloaded.

Lawrence Wants Motors—Mayor Scanlon of Lawrence, Mass., who has been opposing the purchase of an automobile patrol wagon and ambulance for the police department and one piece of motor apparatus for the fire department, on the ground that the city could not afford the money, has at last agreed that the purchase price is available. The aldermen recently submitted estimates totalling \$182,107.32 in excess of the amount necessary to run the city without increasing the tax rate, and of this amount, \$32,800 has been set aside for the motor equipment mentioned.

In the Market—The following cities are interested in the purchase of motor fire apparatus: Brattleboro, Vt., combination wagon; Knoxville, Tenn., chemical engine; Indianapolis, Ind., two pieces; Jackson, Mich., pumping engine; Scranton, Penn., tractors; Puyallup, Wash., chemical engine and hose wagon; Westboro, Mass., combination wagon; Saginaw, Mich., hook and ladder truck and combination wagon; Rock Island, Ill., combination wagon; Collingswood, N. J.; Waukegan, Ill.; Dubois, Penn.; Warren, Mass.; Toledo, O.; Chelsea, Mass.; Moline, Ill.; Utica, N. Y.; Worcester, Mass.; Port Angeles, Wash.; Dillon, Mont.; Battle Creek, Mich.; Leominster, Mass.; Bristol, Penn.; Conshohocken, Penn. (Washington Company); Merchantville, N. J.; Eastlake, Tenn.; Littleton, Col.; Omaha, Neb.; Syracuse, N. Y.; Pawtucket, R. I.; Woonsocket, R. I.; Wakefield, Mass.

FEATURES OF F. R. A. M. ELECTRIC TRUCK.

**Five-Ton Vehicle of Interesting Design Produced in De Dion-Bouton Factory, Paris, France---
Innovations Revealed at Recent British Show---Other Foreign News.**

BECAUSE of the increasing use of electric vehicles abroad, particularly by municipal authorities, etc., some consideration of the F. R. A. M. five-ton model, built in the De Dion-Bouton works, Paris, France, will prove of interest. This is especially true, since within the past few weeks the maker has invaded Great Britain with this machine, and it is not improbable that some effort will be made to introduce it in America.

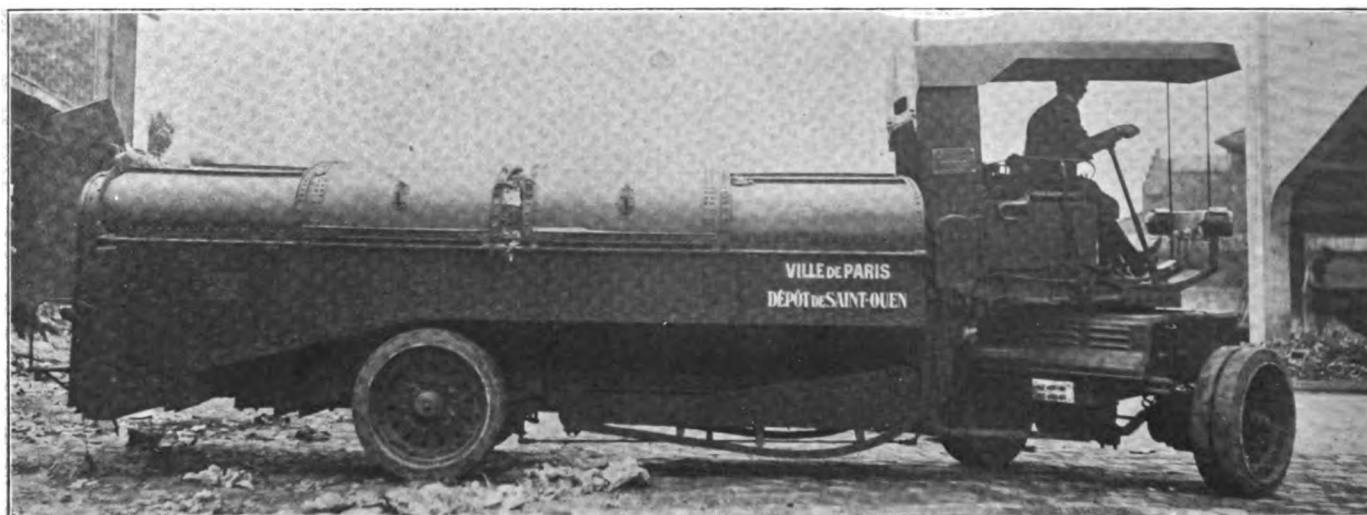
Accompanying illustrations present some of the details of construction, particularly the substantial lines of the chassis. Of course, following the practise generally obtaining abroad, the bodies are built to specifications, and that shown herewith is utilized by the municipal authorities in Paris for the collection of refuse—street sweepings, etc.

It may be added that the type was first produced

The battery is of 44 cells carried in trays, six of which are located on the fore carriage directly above the motors, fully protected by a removable hood, which also provides for easy access to them whenever necessity requires. It will be understood that this fore carriage is fitted on a pivot so that it is possible to swing the road wheels in such manner that either or both sides, or ends, of the hood may be raised at will. This is still further indicated by the illustration, which shows one portion of the hood removed, and the cells exposed. The remainder of the battery, consisting of three trays, is placed under the driver's seat, where it is equally as accessible.

As to Mileage Capacity.

This battery is rated at 350 ampere-hours, with a mileage of from 25 to 30. It is stated, however, that when the vehicle is going down grade it is possible to



Five-Ton F. R. A. M. Electric Truck, Made in De Dion-Bouton Factory and Fitted with Fully Protected Dumping Body, in Service with Paris Municipal Authorities.

in the three-ton capacity, and vehicles of this weight have been in service in France for a matter of a year. The newer five-ton model is identical in design, although, of course, the construction differs, in that the components are made somewhat stronger to take care of the additional load.

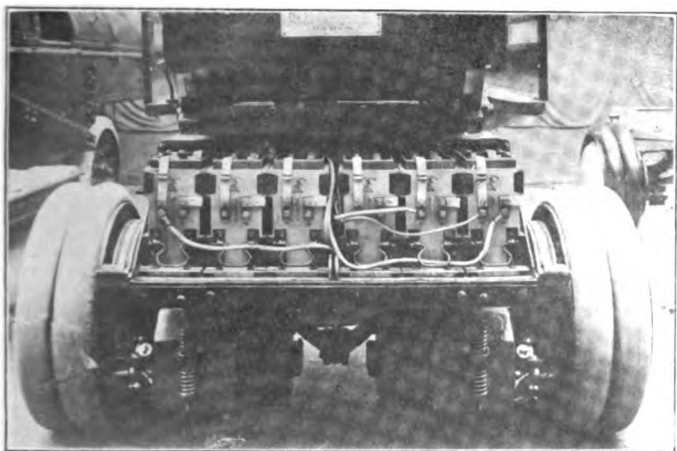
Motors and Battery.

Two seven horsepower compound wound motors are suspended from the fore carriage by coil and recoil springs, each motor driving one forward wheel, independently of the other, through double reduction spur gearing to gear wheels bolted to the inside of the road wheels. This construction is brought out partially in one of the smaller illustrations, although, since the whole arrangement is suitably enclosed, it is impossible to note the details employed.

make use of the motors as braking dynamos, generating current which is returned to the battery as an extra charge. The amount of this extra charge is dependent, of course, upon the character of the locality in which the vehicle is worked.

Five forward speeds and one reverse are provided, and these are controlled by a vertical lever located at the driver's left. The average maximum speed for which the machine is geared is about 7.5 miles an hour.

Steering is by a combination of worm and bevel gear, and the vehicle, which has a wheelbase of 168 inches, has a turning circle of 33 feet. An interesting feature in this connection is that, when turning sharply, contacts automatically put more cells into circuit with one motor than the other, thereby speeding up the outer wheel.



Front View of Five-Ton F. R. A. M. Electric Truck. Showing Battery Trays Exposed for Removal—Note Enclosed Motors Driving Front Wheels.

The maker of the F. R. A. M. has taken into consideration the fact that a vehicle of this type should be available for a wide variety of service, and suitable provision has been made for fitting detachable bodies. The body shown has, as has been stated, been used in Paris for the collection and disposal of refuse. This has been designed with the idea of preventing dust and litter from being blown about the street, and the various compartments are provided with separate covers, two opening from one side and two from the other.

Provision for Dumping.

These compartments open into each other, virtually making but one, so that the vehicle is readily dumped at the rear. One of the smaller illustrations presents an attendant in the act of dumping a load, this being accomplished by means of a hand operated winch, which draws the bottom end of a steel arm on either side along a curved track, forcing the forward end of the body to a suitable angle for discharging the load. A winch is provided on each side, so that two men may expedite the work.

It should be added that the chassis is fitted with dual tires, both front and rear. The weight of the body shown is approximately two tons. Attention also may be drawn to the fact that with the provision for easy access to the battery trays, it is held to be possible to make a complete change of battery in 10 minutes. This is considered a decided advantage in municipal work, since it has frequently been the case in Paris, that a vehicle has been required to cover some 20 or 25 miles in the morning, returning to the garage at noon for a change of battery and performing a like service in the afternoon.

SOUTH AFRICAN LEGISLATION.

Inasmuch as American manufacturers of commercial motor vehicles have found a ready market for their product in the provinces making up the Union of South Africa, there will be some little interest in the new regulations which went into effect in Cape Colony, Transvaal, Natal and Orange Free State the first of the year. These provide for the registration of all

cars, and, with the exception of Natal, there is also provision for registering dealers at £10 a year. In Natal, this fee is £3.

The registration fees for cars in Cape Colony are: Weighing 1500 pounds and under, 30 shillings; 1500-2500 pounds, 40s; 2500-4000, 60s; 4000-6000, 100s; over 6000 pounds, £10. In Transvaal there is a basic charge of £2 a car, with an addition of one shilling a horsepower and two shillings for each 100 pounds weight. In Natal, the fee is £3 a car, but power is reserved to differentiate between cars according to horsepower. In Orange Free State the fee is £2 a car, irrespective of size or horsepower. With all except Orange Free State, registration is to be made annually, and in that province it is perpetual.

Restrictions as to Weight.

In addition, the Cape Colony ordinance provides that where pneumatic tires, or other tires of a soft or elastic material, are not fitted, they shall be smooth, and that where they touch the ground they shall be flat and of the following widths: Cars weighing 1500-2000 pounds, not less than 2.5 inches; 2000-4000 pounds, three inches; 4000-6000 pounds, four inches; over 6000 pounds, one-half inch for each additional 1000 pounds. In calculating the weight of a vehicle unladen, the weight of any water, fuel or batteries used for the purpose of propulsion shall not be included. Where the weight unladen exceeds 1500 pounds, such weight must be painted in one or more straight lines upon some conspicuous part of the right side, in white on black, and in letters not less than one inch in height.

In the Cape Colony a car exceeding 500 pounds in weight unladen must be fitted with reversing gear. Under the Natal ordinance, all cars exceeding 700 pounds must be so fitted. Under the Cape Colony ordinance, also, where a vehicle is being drawn by a motor car, such vehicle must have an efficient brake in good order acting on two wheels, and unless this brake can be controlled properly from the motor car, a person competent to manipulate it must be carried on the trailer. Trailers must comply with the regulations



Indicating Method of Operating Dumping Mechanism on F. R. A. M. Machine Utilized by Paris Officials.

as to cars in respect to width, tires, and also with regard to having the weight painted on the side. The Cape Colony ordinance provides that the extreme width of the car shall not exceed seven feet two inches, and the Natal ordinance, six feet six inches.

NEW FEATURES IN DESIGN.

The efforts of the British manufacturers to interest those in a position to attract sight-seeing trade in the use of so-called char-a-bancs appear to have met with decided success. Applications to operate vehicles of this character have been received from many places along the coast, the largest number being recorded from Blackpool, where the total is nearly 100.

In view of this situation, it is not surprising that several char-a-bancs were on view at the recent North of England show in Manchester, England. Most of these might be classified as of standard design, this having reference, of course, to the body work. However, the char-a-banc body fitted to the Tilling-Stevens

makers in this country. The Austin carries the plan still further, fitting the radiator directly behind the dash, where, as will be seen, it takes but about half of the space, still leaving abundant room for the steering wheel, controls, etc.

An entirely new type of mileage recorder is presented in the Thornycroft. This is a direct driven instrument, built into the gearbox, with the dial showing at the side, as indicated in the drawing. An interesting addition to the standard mechanism is the use of a winding drum centred on the main driving shaft back of the gearbox. This is brought into engagement with the shaft by means of a dog clutch operated by an easily reached handle outside the frame member.

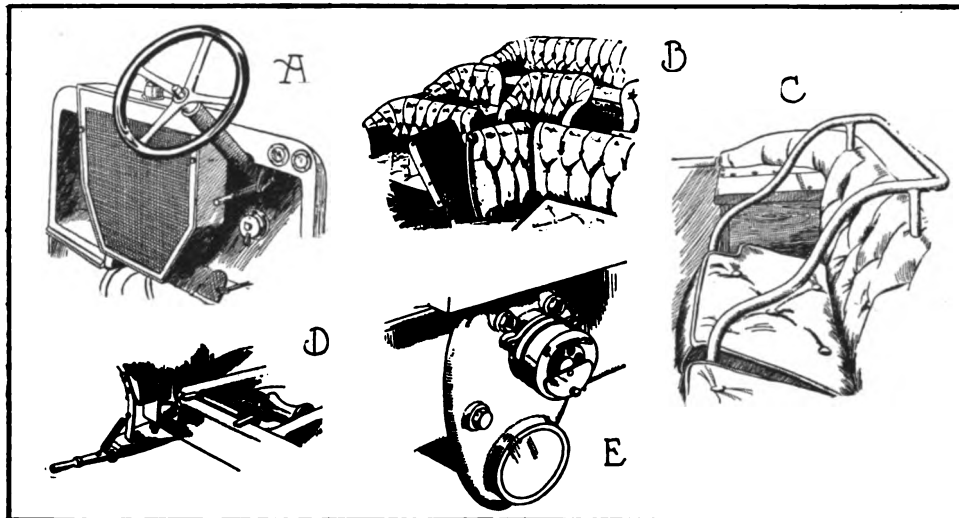
GENERAL NEWS FROM ABROAD.

Motor Trucks in China—According to Motor Traction, a British publication: "The industrial motor is said to be making some progress with Chinese carrying firms, and a number are at work in and around Tientsin. Some of the interior posts in China have their supplies delivered by means of motor, but there is still much headway to be made. American exporting firms are said to be looking well after this trade, and it is understood that their agents are in some cases supplied with motor vehicles on 'sale or return'."

American Vehicles in India—A writer in the Contract Journal, an East Indian publication, states that a delegate from Gwalior State has been

over to America for purpose of inspecting motor agricultural machinery made there, and is bringing back with him two oil tractors, a threshing machine and other agricultural implements. He is said to consider American tractors better suited than steam tractors and plows to Indian soil and climatic conditions, besides being cheaper in price and simpler in design.

Favors Steam Wagons—It is understood that the Parliament of the Commonwealth of Australia has abolished the 20 per cent. duty on chassis imported into the states comprising that commonwealth, insofar as it applies to steam vehicles. Inasmuch as by far the larger proportion of steam vehicles manufactured are produced in Great Britain, this action would appear to be a move destined to provide a serious competition for American makers of gasoline machines, which were beginning to enjoy a good sale in the Australian states.



Innovations in Design Revealed at Recent British Show: A, Novel Placing of Radiator on Austin Machine; B, Unique Arrangement of Rear Seats on Tilling-Stevens Char-a-Banc; C, Insuring Driver's Elbow Room on Tilling-Stevens; D, Thornycroft Mechanical Hoisting Gear; E, New Gear Driven Mileage Recorder on Thornycroft Model.

gasoline-electric chassis was of particular interest because of seating arrangement, both for passengers and driver.

As will be noted by the accompanying sketches, provision has been made for entering the seats at the extreme rear without the necessity for fitting a door over the rear wheel. It is understood that space also is provided for carrying a small table in the back compartment. The arrangement of the driver's seat is with reference to insuring that the operator shall have plenty of elbow room.

One or two other innovations were brought to light at this show, as indicated by the sketches, one of which presents the new type of radiator fitted to British made Austin machines. A number of foreign makers have favored the location of the cooler behind the engine, the principal argument being that in this position there was much less danger of injury to it. This practise already has been adopted by some

CORRESPONDENCE WITH THE READER.

Installing Magneto.

Am rebuilding a pleasure vehicle for business work and, as the motor is not fitted with a magneto, desire to install one. Can you give me a few points on selecting and installing a magneto?

INFORMATION.

Weehawken, N. J., Feb. 17.

There are two general types of magneto, a true high-tension, in which no step-up or transformer coils are needed, and the low-tension, some types of which are also termed high-tension. The first named permits of starting the motor on the magneto, although some makes provide for use of dry cells or a storage battery for starting purposes.

The low-tension generally provides dual ignition, in that the motor may be operated on the magneto or cells, the latter being utilized for starting. The different types of instruments are being described and illustrated in the ignition serial now running in the MOTOR TRUCK.

It is important in selecting a magneto to ascertain how it is to be driven and the direction of drive, although some makers provide for both clockwise and anti-clockwise. The driving end of the instrument is usually marked with an arrow, denoting the direction. It is also important that the size of the motor, that is, the bore and stroke, be taken into consideration, as a large engine will require an instrument with a greater output than a small. Manufacturers of magnetos are listed in the Classified Buyers' Guide, found elsewhere in this issue, and they will supply complete data on request. In writing state bore and stroke of cylinders, number of cylinders and whether the engine is a two or four-cycle unit.

Jump Spark Ignition.

Is it necessary to have a coil with the high-tension system of ignition? Is a coil used with magnetos? Assuming that the voltage of half a dozen dry cells is six, what is it when the current jumps the gap of the plug?

C. W. B.

Cleveland, O., Feb. 27.

With the jump spark system of ignition a secondary winding is necessary to increase the electromotive force in the secondary circuit, so that it will overcome the resistance at the gap of the spark plug. Air is a non-conductor of electricity and with the space of .03125 inch between the electrodes of the plug, which is practically a break in the circuit, sufficient energy must be developed for the electricity to jump the gap.

Coils are employed with low-tension magnetos, those having but a single winding; that is, the armature. These types generate a low-tension or primary current which is built up or transformed by a separate coil. The induction coil comprises a winding of coarse (primary) wire, and another of fine (secondary) wire. This self-induction, so-called, is greatly increased by utilizing a core of soft iron wires around which the windings are placed. The same principle is employed with magnetos.

The voltage of the dry cells referred to is not sufficient to overcome the resistance of the air at the gap

of the plug. The resistance to the current increases with the pressure of the air which surrounds the points, and with the internal combustion engine the spark is employed to ignite the charge after it has been compressed by the piston, consequently considerable voltage is necessary.

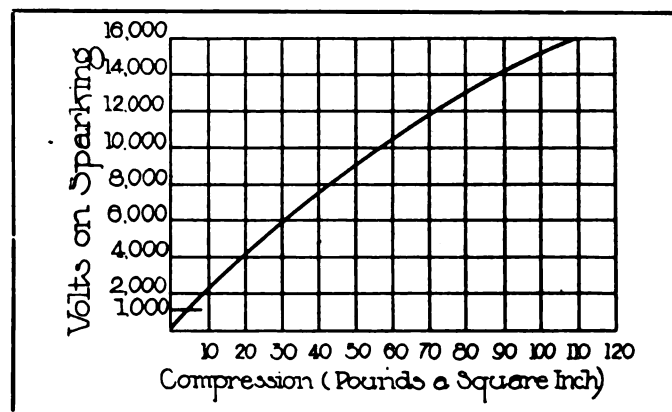
The actual voltage needed is shown in an accompanying chart, the diagram depicting the electromotive force required to bridge a .02-inch gap with various compressions. At 80 pounds compression it will be noted that over 12,000 volts are necessary to overcome the resistance to which reference is made.

Assembling Light Truck.

Would you advise purchasing parts of a chassis and making them up into a light truck, one capable of carrying a ton or more? I note a number of concerns advertising rear axles, motors, transmissions, etc., at bargain prices. MERCHANT.

Binghamton, N. Y., Feb. 18.

While the writer knows of instances where trucks were assembled or built as suggested, he does not



Curve Showing Voltage Required for High-Tension Current to Bridge a .02-Inch Gap with Various Compressions.

favor it for several reasons. In the first place the commercial car effects economy because of a saving in time, and with a construction such as outlined, the breaking of a part or damage through accident may mean a considerable loss of time before the new part can be obtained. And it follows that more or less of the construction will require machine work, etc., to fit, which means a delay in the renewal of components.

The better plan is to purchase a standard make, one particularly adapted to the work, for it will be possible to obtain parts that will fit and very quickly when needed. Sometimes the cost of an assembled machine exceeds that of a standard make.

Vulcanizing Tubes, Etc.

Are the popular priced vulcanizers that use gasoline practical for repairing inner tubes and mending cuts on tires, and do they require experience to operate?

W. E. K.

Bridgeport, Conn., Feb. 26.

The vulcanizers referred to are practical. The writer knows of a number of concerns using them with success. They do not require experience as the instructions accompanying each equipment are very complete and easily followed.

THE A B C OF MOTOR TRUCK IGNITION.

Part XIX---Construction and Operation of Eisemann Magnetos, Utilizing Tapered Pole Pieces Which Are Held to Increase Intensity of the Induced Current---Single and Dual Forms---Automatic Spark Control.

By C. P. Shattuck.

ONE of the oldest and best known manufacturers of magnetos for internal combustion engines is the Eisemann Magneto Company, Brooklyn, N. Y.,

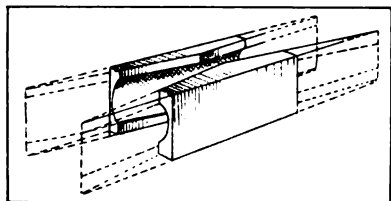


Fig. 110—Eisemann Pole Pieces.

and Stuttgart, Germany. Its product is standard equipment on commercial and pleasure vehicles both in this country and abroad, and the confidence of the company in its line is evidenced by the guarantee attached, covering it against defects in workmanship and material for a period of one year from original date of shipment.

Single and Dual Types.

With one exception the magnetos marketed by the Eisemann Magneto Company are of the true high-tension type, and this line includes both single and dual ignition water proof instruments. The single ignition system is defined as one having but one source of current supply, and obviously it is utilized both for starting and operating the motor. The dual provides two sources of current supply, usually dry cells or a storage battery, and the magneto. As previously outlined, some makers utilize the one interrupter mechanism for breaking the primary current of both sources of current supply, while others incorporate a separate or independent mechanism.

Pioneer Maker of Dual System.

The Eisemann dual system makes use of an independent battery circuit breaker, and in this connec-

tion it is interesting to note that the company claims the distinction of having devised the first dual ignition system, as early as 1903. It was termed the Eisemann-Panhard-Levassor system, and was followed a short time later by the Eisemann-Carpentier ignition.

The Eisemann-Carpentier dual system comprised a battery system independent of the magneto timer or coil. In it the battery current was commutated by a separate timer, while a double unit coil was utilized. The high-tension distributor of the magneto was utilized to deliver the secondary current of both coils. One unit of the coil was of plain form, designed for use only with the magneto; the other, a vibrator element constructed to use the battery energy. A single switch, a part of the coil, controlled both systems, and a push button on the face of the coil permitted starting of the motor on the spark.

Another early form was that employed with the model 19 Peerless pleasure vehicle. It comprised two separate and independent systems, the battery group consisting of a four-unit coil, timer, source of current and a set of spark plugs. The magneto system included the magneto, switch, transformer coil and a set of spark plugs. This arrangement involved a multiplicity of wires, quite at variance with the simplicity of the present day ignition installations.

Eisemann Type E M.

The Eisemann magneto is produced for single and multi-cylinder, two and four-cycle motors; is made in single and dual forms, and with some models the automatic spark advance or control is incorporated. As the construction of the components productive of en-

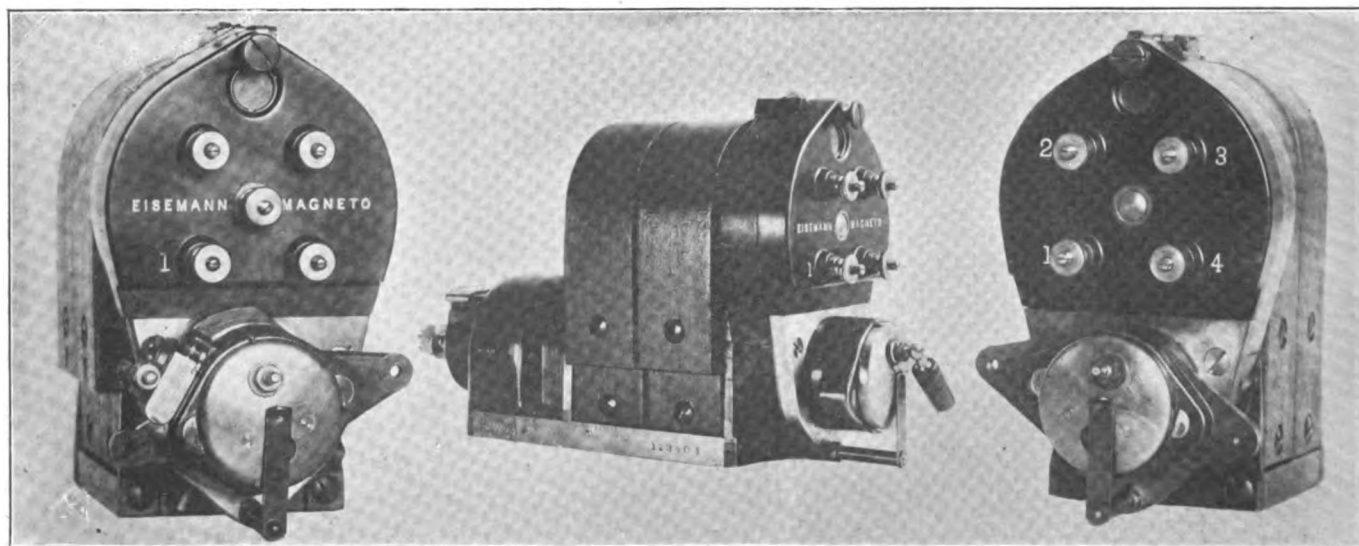


Fig. 111—Types of Eisemann Magnetos: At Left, E M, Dual; Centre, Instrument with Automatic Spark Control; at Right, E. M Single or True High-Tension—Note That Each Distributor Plate Is Provided with a Timing Indicator or Window.

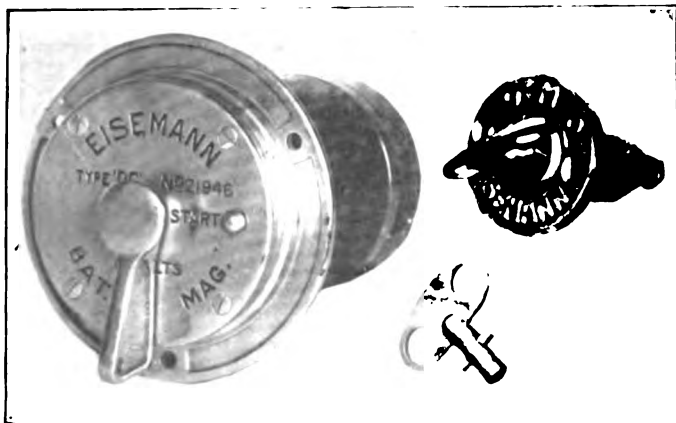


Fig. 112—D C Coil Utilized with Eisemann Type E M Dual Magneto—A Key Type of Switch Is Shown at the Right.

ergy is similar, a general discussion of the type E M instrument will serve to explain how current is generated, transformed and utilized.

As with the conventional types of true high-tension magnetos, the armature of the Eisemann instruments carries a double winding, a primary and a secondary. The primary comprises windings of medium gauge copper wire and the secondary of many coils of very fine copper wire which is specially insulated, as are the layers, from each other. The shuttle armature is mounted on annular ball bearings and when rotated in the magnetic field by outside energy, a low-tension current is produced. By interrupting the primary current, a secondary or high-tension current is induced in the fine windings of the armature. The Eisemann armature is an iron core made up of many pieces of soft sheet iron riveted together, and the maker states that only the most skilled workmen are employed and the highest grade of material utilized. The inspection and tests are unusually rigid.

How Pole Pieces Differ.

The maker of the Eisemann magnetos calls special attention to the pole pieces employed. These are tapered; that is, the most extended portion thereof is approximately opposite the theoretical axis of the winding upon the armature core. It is stated that this construction results in the flow of magnetic lines of force being drawn from the extremities of the pole pieces toward the centre of the core, and that the entire volume of the magnetic lines of force are thus forced through the armature. This is said to prevent diffusion of the lines of magnetic force, resulting in increasing the volume and intensity of the induced current and the production of a hotter spark at the spark plugs. The construction of the pole pieces is shown at Fig. 110, and it is held that at no time is the armature isolated entirely from the pole pieces. This arrangement

makes use of the armature as a keeper for the magnets, preventing demagnetization. It is also stated that sudden breaking of the magnetic field is prevented, reducing wear on the couple of gears driving the magneto, and that quiet operation is assured. The imported magnets are of the conventional horseshoe type.

Make and Break Mechanism.

The make and break or interrupter mechanism, which alternately joins and suddenly separates the two ends of the primary current, follows conventional practise and consists of a bronze plate with an integral cone. It is bored to fit the armature shaft and is provided with a keyway to secure it and to insure its proper replacement in the event of its removal. The construction is locked to the armature shaft by a removable screw, and the make and break mechanism rotates with the shaft. One of the qualities of the Eisemann interrupter mechanism is the use of a lock spring to prevent loosening of the screw retaining the make and break mechanism, which may be displaced as a unit.

Operation of Mechanism.

The interrupter mechanism of the single or independent type of magneto is shown at Fig. 115, the components being lettered. The primary current generated by the magneto is led from the low-tension winding, through the armature shaft to a fixed platinum contact screw by the insulated screw retaining the bronze plate to which reference has previously been made. Pivottally mounted on the plate member is a contact lever having a fibre abutment or block. The timing lever body or housing enclosing the mechanism has two steel cams with which the fibre block makes contact, causing the lever to raise and to break contact of the platinum points. This making and breaking occurs twice during each revolution of the armature shaft, inducing a high-tension current in the secondary winding, one end of which is connected with the primary wire while the other is attached to a collector ring from which the current is taken up by a

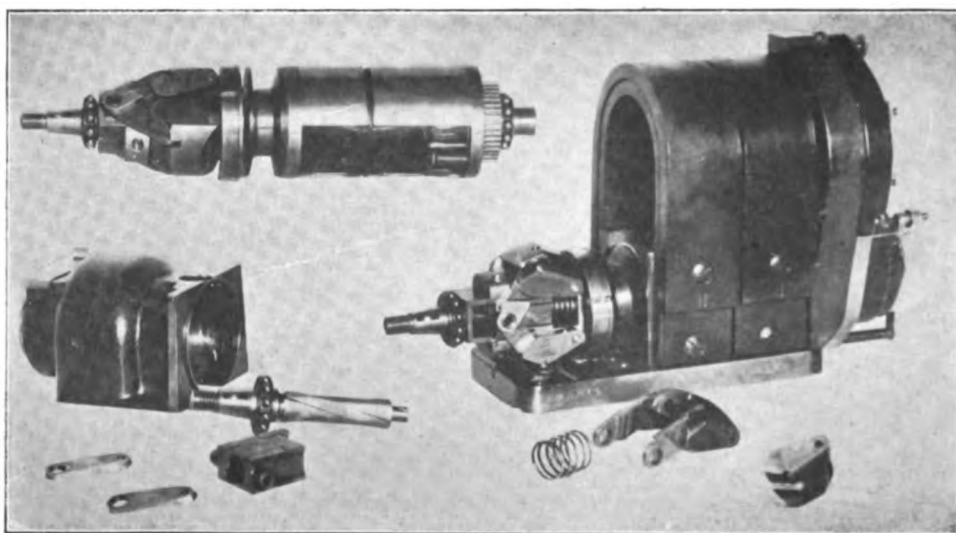


Fig. 113—Showing Components of the Automatic Spark Control in Place and Removed from the Magneto.

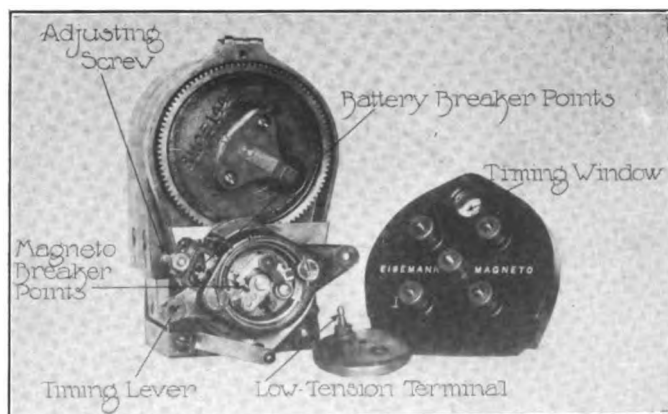


Fig. 114—Eisemann Type E M Magneto, Showing Magneto and Battery Make and Break Mechanism.

carbon brush and led to the distributor brush. The distribution of the high-tension current to the spark plugs is accomplished in the conventional manner. The usual condenser and safety spark gap, the function of which has been described previously, are incorporated.

Rotation and Speed.

The Eisemann magneto is constructed to be driven clockwise and anti-clockwise, and the armature must be rotated in the direction indicated by the arrow marked on the driving end of the instrument. Four-cylinder, four-cycle motors require that the magneto be driven at crankshaft speed as two sparks occur during each revolution of the armature shaft. Six-cylinder, four-cycle magnetos are driven at 1.5 times crankshaft speed; three-cylinder at three-quarter crankshaft speed, and two-cylinder units at half crankshaft speed. Magnetos utilized with four-cylinder, two-cycle motors are driven at twice the crankshaft speed.

Wiring of E M Magnetos.

The wiring of the type E M magnetos is simple, as will be noted by referring to Fig. 117, which depicts the manner in which the primary current is short circuited or diverted from the secondary winding. The end cover of the interrupter is provided with a terminal which is connected by an insulated wire to the switch, and another lead connects the other pole of the switch to some metal part of the car, forming a ground when the switch lever is moved to the "off"

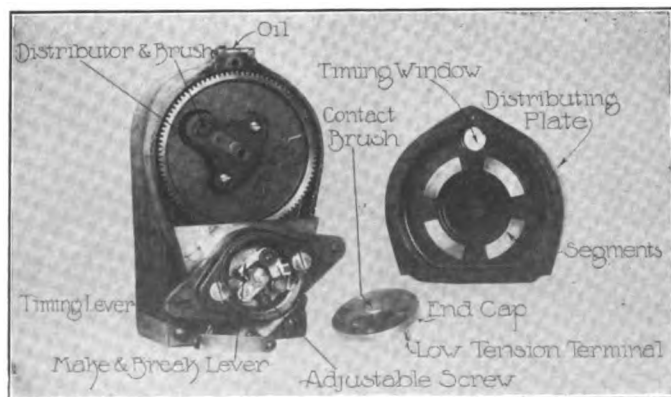


Fig. 115—Eisemann Type E M Magneto, a True High-Tension Instrument, with Distributor Plate Removed.

position. Fig. 118 shows the latest type of Eisemann kick switch, a neat, durable design.

E M Dual System.

The Eisemann high-tension dual system consists of the type E M magneto and a combined coil and switch, the former being utilized to increase the voltage of the primary current when operating on the battery. One of the qualities of the system is that the make and break mechanism of the magneto and of the battery are separate and independent constructions, an arrangement permitting of the use of the battery mechanism, for example, should the magneto interrupter become damaged, or vice versa. The distributor mechanism, however, is utilized with both battery and magneto currents because it is efficient and durable and rarely gives trouble.

The simplicity of the battery breaker mechanism is shown at Fig. 114, which illustration depicts the distributor plate displaced to show the distributor gear and its brush. The battery breaker mechanism is mounted at the back of the magneto breaker construction, and consists of a steel cam, having two projections which actuate a steel lever mounted into the

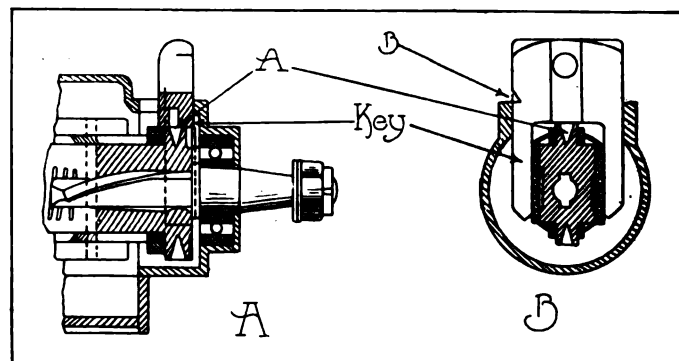


Fig. 116—Illustrating Use of Key in Timing or Setting Eisemann Magneto with Automatic Spark Control.

breaker housing. One of the features of the battery mechanism is its accessibility and ease of adjustment, the screw regulating the gap between the points being adjustable from the exterior of the housing.

Function of Coil.

The coil utilized with the dual system is shown at Fig. 112. It is of the non-vibrating type and combines a switch with a starting mechanism, also a push button which, when depressed, with the lever on the battery side, is productive of a single spark in the cylinder of the motor. The D R C type of coil has a ratchet arrangement which results in a series of sparks. Both designs are mounted in a compact case which is fitted to the dash, but the coil and switch rotate within the housing. One of the qualities of the design is that it may be dismantled readily and the coil core displaced.

The wiring plan of the system is shown at Fig. 119. The high-tension current is led from the collecting ring of the magneto at H M to a similarly marked terminal on the coil, thence to the switch member H on the coil, and to H on the magneto. The last named terminal is in connection with the distributor arm and

brush. Distribution is in the usual manner.

When the switch lever is moved to the "Battery" position, the primary current of the magneto (M A, Fig. 119) is grounded. The battery current flows into the coil at +, through the coil and thence to R on the coil to R on the magneto, where it is interrupted. From the battery breaker the current returns to the battery through the ground. With the motor inoperative, the interrupter is inactive, necessitating the use of the starting push button to which reference has previously been made. Placing the switch lever in the "Off" position, when operating on the battery, cuts off the current from the coil, and the magneto current is also short circuited. Moving the lever quickly from the battery to the magneto position results in the magneto supplying current for ignition.

Automatic Spark Control.

With magnetos equipped with variable advance—that is, having interrupter mechanism that may be manually operated to cause the break of the primary current to occur earlier or later—the operator or driver depends upon his judgment as to the proper advance.

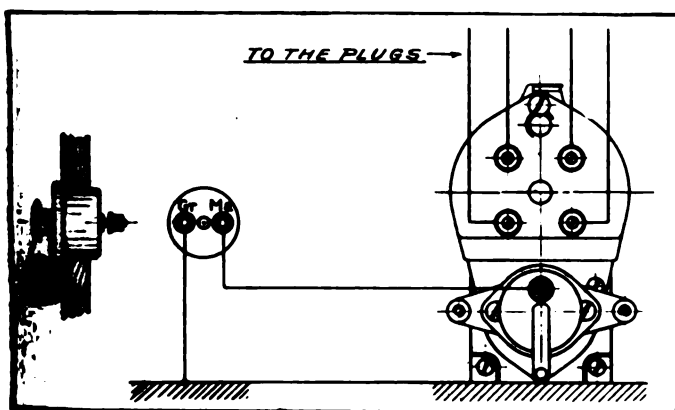


Fig. 117—Wiring Plan of Type E M Single Eiseemann Magneto—The Fine Lines Indicate Primary Leads and Connections.

It has been pointed out in previous discussions that the greatest efficiency or hottest spark is obtained when the greatest number of lines of force are cut, or in other words, when the armature is in a certain relation to the pole shoes. It is at an exact point that the break of the contact points should occur. If the spark occurs too late, the motor will not develop its maximum efficiency, and if too early, its mechanism is likely to be subjected to undesirable stresses.

These faults are held to be overcome in the Eiseemann magneto fitted with the automatic spark control shown at Figs. 111 and 113. Among the advantages of the construction emphasized are: The elimination of the spark lever and linkage, increased flexibility and 60 degrees advance, economy of fuel, easy starting, automatic retard of the spark when starting, and a uniform, intense spark at all motor speeds.

Construction of Control.

The components of the automatic spark control are shown at Fig. 113. The magneto is of the same construction, as the standard high-tension instrument just described, with the addition of the automatic mechanism. The advance is obtained by the action of centri-

fugal force on a pair of weights attached at one end to a sleeve through which runs the shaft of the magneto and hinged at the other end of the armature. Along the armature shaft run two helicoidal ridges which engage with similarly shaped splines on the sleeve.



Fig. 118—Eiseemann Kick Type of Switch.

When the armature is rotated, the weights move outward, exerting a longitudinal pull on the sleeve, which in turn changes the position of the armature with reference to the pole pieces. In this way the moment of greatest induction is advanced or retarded and with it the break in the primary circuit, for the segments or cams which left the circuit breaker and cause the break of the primary circuit are fixed in the correct position, and thus it is held that the interruption of the primary current occurs only at the moment when the greatest number of lines of force are cut.

To apply the automatic control principle to any motor, there have been produced advance spindles of varying pitches, obtaining 19, 25, 38, 45 and 60 degrees advance. For use in connection with these spindles there are 16 different springs, and the company states that with these parts, in connection with the governor mechanism, 160 advance curves may be obtained, and by varying the length of the stop on the bronze nut, many more are possible.

Novel Timing Device.

One of the qualities of the construction is the simplicity of the timing of the instrument. At the back of the automatic regulator case is cut a slot. By inserting a special key the armature is held in the proper position for connecting it to the driving member. This eliminates noting the position of the armature or break of the contact points, and a further advantage

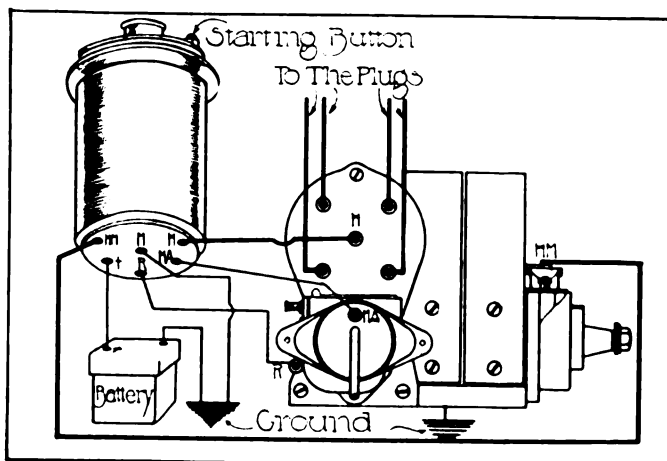


Fig. 119—Wiring Plan of Eiseemann Type E M Magneto Providing Dual Ignition.

is that the key prevents movement of the armature, simplifying the setting of the instrument.

The arrangement is shown at Fig. 116, A being the pin of the key which catches in one of the holes of the rectangle. It is essential in the timing operation that the point B and the edge of the regulator case correspond.

Care and Maintenance.

The Eisemann Magneto Company recommends that the break or gap of the magneto contact points of its instruments be .015625 inch and those of the battery slightly more. With the dual system, six-volt storage batteries, or 10 dry cells connected in multiple series, are used. In the matter of wires, it is stated that the high-tension cables should be .3125 inch in diameter and those of the primary .21875 inch. The gap of the spark plugs should be the same as the magneto contact points, .015625 inch. The parts requiring lubrication are marked "Oil", and a few drops of high grade lubricant should be used every 1000

licensees under these patents, which are designated as follows:

Hunter	670,405	March 19, 1901
Hunter	696,143	March 25, 1902
Hunter	625,953	May 30, 1899
Thayer	678,063	July 9, 1901
Martin	1,018,248	Feb. 20, 1912
Hight	693,836	April 29, 1902
Liebau	655,724	Aug. 14, 1900

In addition to the above, applications for patents for improvement of the devices and combinations stated above are now pending. The statement is made that the owner of the patents and the licensees will avail themselves of every protection afforded by law to prevent invasion of their rights, and that this is intended to be of general information to the trade.

Included with this are diagrams representing the combination of a motor truck with a trailing wagon supported on wheels at the rear and supported on the truck at the front by means that will admit of a rocking motion, and a combination providing for a more resilient support for the frame carrying the motive

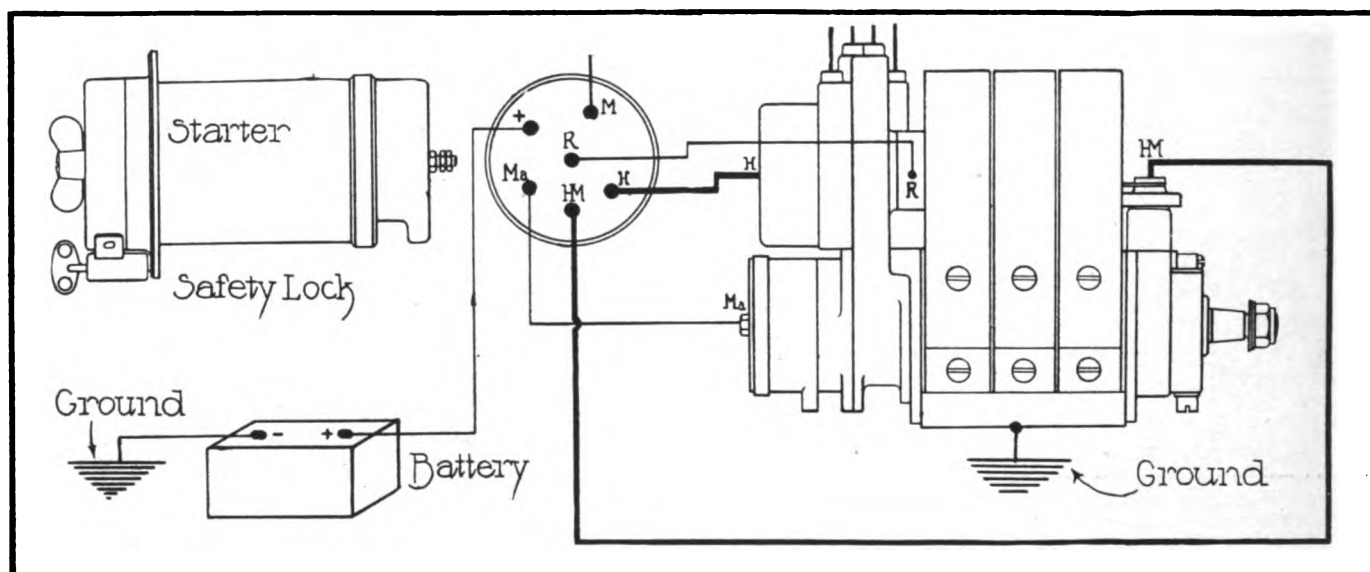


Fig. 120—Wiring Diagram Utilized with Coll D 2 U—The Heavy Lines Indicate Secondary Wires; the Light, Primary.

miles of service. Lubricant should be used sparingly, as flooding the parts will breed trouble.

(To Be Continued.)

Ed. Note—The next installment will deal with the various types of instruments manufactured by the Simms Magneto Company.

MARTIN TRACTOR PATENTS.

The Martin Tractor Company, Springfield, Mass., has caused information to be sent generally to motor vehicle manufacturers, dealers and users, that no combination of any automobile with a wagon in such a manner that the wagon is supported on wheels at the rear and in front on the back of the automobile by any rocking connection whatever, can be made without infringing upon the basic patents owned by C. H. Martin. The Martin Tractor Company and the Knox Automobile Company, Springfield, Mass., are the only

machinery than for the wagon carrying the load. With the Martin tractor the forward end of the wagon carrying the load is supported on a turntable so pivoted that the elevation or lowering of the rear wheels above or below the plane of the tractor frame will not cause stresses upon the tractor.

The management of the Universal Motor Truck Company, Detroit, Mich., is now directed by George Uihlein of Milwaukee, who has established headquarters at Detroit. F. K. Parke, formerly vice president and general manager, and G. L. Brush, formerly assistant secretary, have retired from all association with the company.

The address of the executive secretary of the Electric Vehicle Association of America is now 29 West 39th street, New York City, where all communications not intended to reach the business office of an official of the association should be addressed.

HINTS FOR PROPER MAINTENANCE.

IN THE absence of a grinding machine some workmen complete repairs by boring and turning, when a fine degree of accuracy would be advisable.

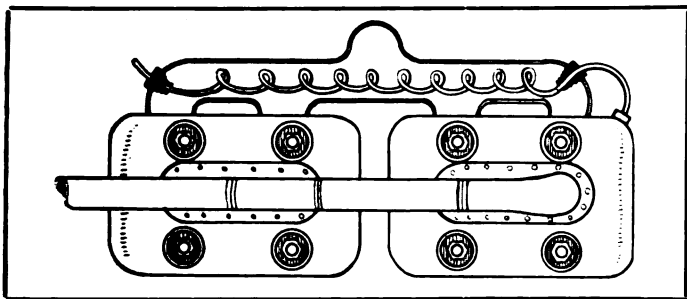


Fig. 1—Novel Use of Copper Tubing in Intake Manifold.

Many repairmen do not care to go to the expense of installing grinding machines, although desiring their use. At Fig. 2 is presented a grinding attachment, the designer of which states may be attached to any engine lathe of sufficient centre capacity.

The grinder itself is carried by a slab and stud-shaft, the arm of which is about 1.75 inches in diameter, so as to insure the necessary rigidity. The slab is attached to the face plate of the lathe by means of two .75-inch bolts, of which the top one is arranged in a radial slot, to facilitate adjustment of the work in hand. Upon the arm of the studshaft is mounted a length of solid drawn hydraulic tubing, which revolves on two brass bushings forced and sweated into the ends of it, thus leaving an annular space for the lubricant.

The tube carries a driving pulley on its inner end, the grinding stone being attached to the outer end. The driving pulley is secured to the tube by means of two set screws. This pulley is fitted with a sufficiently convex face, in order to eliminate lateral slip of the belt. The outer end of the tube is threaded to receive a thimble, which is screwed and sweated into place.

Owing to the concentric path which the grindstone spindle follows, the use of a floating countershaft is necessary. The connecting rod to the latter is shown broken off in the lower illustration, and the arrangement of the floating countershaft is depicted in the upper drawing. As previously mentioned the feed of the grinding stone is adjusted by the bolt situated in the radial slot, while the travel is supplied by the lathe slide rest.

NOVEL USE OF HEAT.

A novel use of the hot water of the cooling system is shown at Fig. 1, it consisting of utilizing a coil of copper tubing inside the intake manifold of the motor. As will be noted, one end of the tubing is tapped into the water jacket of the last cylinder and the other end to the pump, thereby forming a hot water circuit from the jacket, through the coil, and back to the pump.

The copper tubing is bent to form a helix, and with annealed pipe it is an easy matter to obtain the required spiral on an ordinary broom handle.

Two half-inch holes are drilled in the intake manifold, through which the coil of tubing is threaded. The openings are closed by two small brass bushings, these also serving to retain the tubing in place. Leakage of air is eliminated by sweating the tubing to the bushings. By the use of an ordinary pipe union at each end of the coil, the tubes leading to the water jacket and pump are attached as shown in the illustration. It is stated that there are two advantages to be derived from the device. First, the incoming mixture is given a swirling motion, thereby breaking up any particles of fuel not vaporized by the carburetors; second, the heat prevents the possibility of condensation of the fuel and also makes for a more homogeneous mixture.

HARDENING SMALL DRILLS.

Hardening and tempering small taps and drills requires considerable care and experience if perfect work be obtained. When undertaking the work the taps and drills are held with the spiral or thread immersed in lead which has been brought to the melting point in an iron or earthenware crucible. Pieces of very small diameter should be left in the molten metal for about 60 seconds. They should then be withdrawn and plunged in cold water. If the bath be of the correct temperature no lead will adhere to the work when they are removed.

After chilling the tools should be cleaned and tempered. The most convenient way is to lay them on a sheet of old iron held over a charcoal and gas fire. The tray should be rocked a little during the process in order that the pieces may be heated uniformly. When they attain a dark straw or gold color they should be

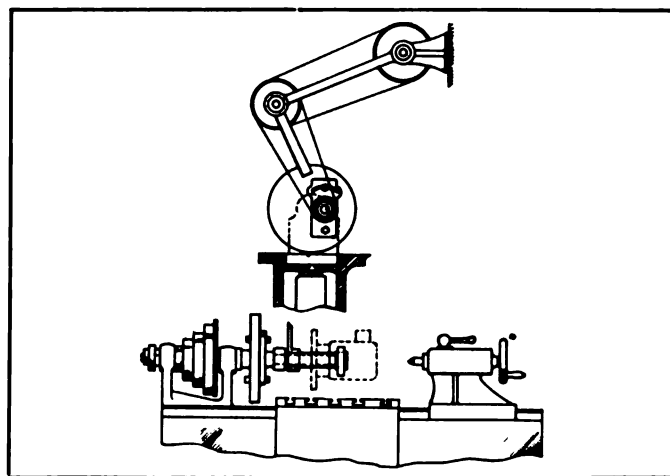
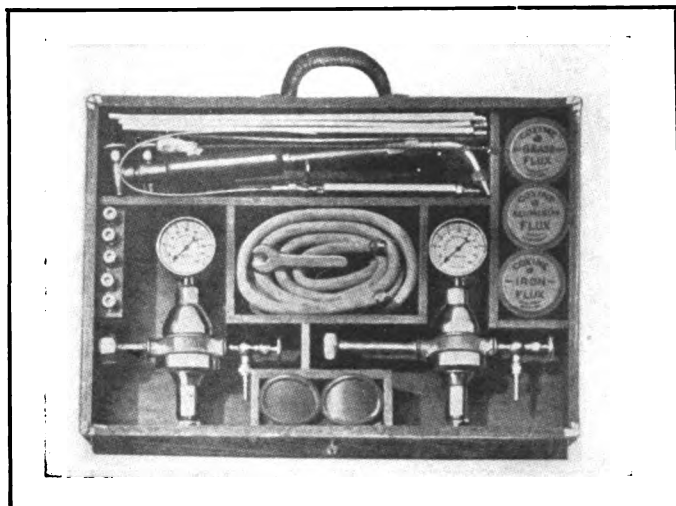


Fig. 2—Grinding Attachment for the Lathe.

again plunged in water. It is held that by the above treatment the degree of heat is strictly limited, and it is impossible to burn the edges as with an open fire.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

A COMBINATION welding and decarbonizing outfit is being marketed by the Cox Brass Manufacturing Company, Albany, N. Y. It provides means



Case Containing Tips, Valves, Etc., Utilized with Cox Combination Welding and Decarbonizing Outfit.

for removing carbon from the cylinders of the motor by the use of the oxygen process and for welding broken parts. It has several advantages, perhaps the most prominent of which is the saving of time. Ordinarily the work is sent outside, which generally results in delays, and, in addition, the profit accruing to the garage, repairman, etc., is very small, this usually being a percentage.

With the Cox outfit the welding work may be performed quickly by the repairman, and the company states that the operation of the equipment can be learned in a very short time by the average mechanic. One of the qualities of the apparatus emphasized is that it will do the work thoroughly, welding broken parts made of brass, steel, iron, bronze, copper and aluminum. With the equipment it is obvious that many repairs formerly requiring considerable time with old methods can be made quickly.

The process of welding is well known. The principle of the method is the use of a small concentrated flame of a temperature approximating 3600 degrees Fahrenheit, applied directly to the metals to be welded.

The Cox dual equipment comprises a highly polished oak case, nickel trimmed, with cover and handle as shown in the accompanying illustration. The case contains a welding torch with six interchangeable tips, sufficient to perform welding on all kinds of work; one oxygen reducing and regulating valve, with gauge and shut-off; one acetylene reducing valve, with gauge and shut-off, fitted with special coupling for attaching to Prest-O-Lite gas tank; 12 feet of acetylene hose, 12 feet of oxygen hose and a complete assortment of welding rods for welding copper, brass, iron, bronze, steel and aluminum. The wrenches, goggles, etc., are packed in a special, convenient case.

In addition there is included a decarbonizing torch

and swab for removing carbon from motor cylinders by the oxygen process. The last named provides the dual equipment to which reference is made above.

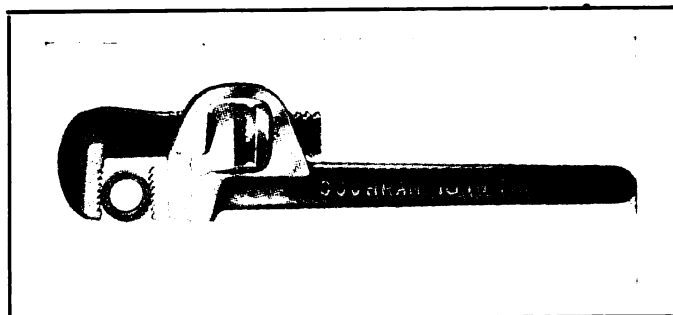
The Cox Brass Manufacturing Company calls especial attention to the low cost of the apparatus, which is marketed as a unit or separately. A special gauge for showing the supply of oxygen on hand is listed at a slight extra cost. The company supplies complete instructions for the use of both systems, and maintains a free service department for the benefit of its customers. One of the features of the department is the expert information supplied for repairs out of the ordinary.

The company calls especial attention to the regulator or reducing valves, stating that they are so constructed as to automatically reduce the pressure of the oxygen from that of the tank of 1800 pounds, and that of the acetylene tank from a pressure of 200 pounds, to a low, workable pressure of from zero to 25 pounds. The pressure is regulated to an even consistency and does not vary from a set amount. Complete details and price lists will be forwarded upon application to the company.

COCHRAN PIPE WRENCH.

The Cochran Pipe Wrench Manufacturing Company, 78th street and Woodlawn avenue, Chicago, is marketing the Cochran pipe wrench shown in an accompanying illustration. It is warranted to give 50 per cent. more service than conventional designs, and the guarantee is very liberal. One of the qualities of the tool emphasized is that the compression strain is exerted on that part of the member which is the strongest.

The frame and handle are one solid piece, and a rocker replaces the usual pin, eliminating opportunity of shearing stresses. The jaw is of the hook type and is with the inserted jaw, drop forged from the best grade of tool steel. The rocker and adjusting nut are also constructed of high grade material.

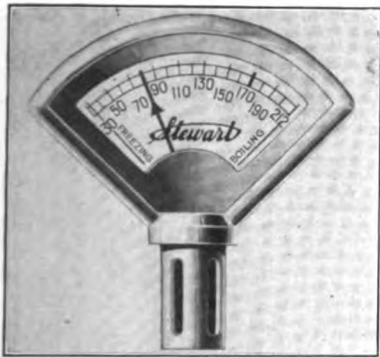


Cochran Pipe Wrench, Having a Solid Frame and Movable Hook Jaw.

The maker claims a perfect grip and release by its construction, and states that the tool cannot be injured by a side pull, owing to its solid frame construction. It is guaranteed not to crush or lock on pipe.

STEWART AUTO THERMO-METER.

The Stewart-Warner Speedometer Corporation, Chicago, has brought out a thermostatic temperature indicator, termed the Stewart Auto Thermo-Meter, which is attached to the filler cap of the radiator and registers, by means of a hand passing over a calibrated dial, the temperature of the water cooling system.



Stewart Auto Thermo-Meter.

One of the qualities of the design emphasized is that a thermostat is utilized and its bar is affected by the temperature of the air over the water. The heat or cold so actuates this bar that it moves a pointer over a calibrated, glass covered dial. The last named provides for readings from 30 to 212 degrees Fahrenheit, and it is stated that the figures may be read easily. It is also claimed that, owing to the pointer hand moving over a curved dial, it is a simple matter to determine its position even when it is so dark that the Thermo-Meter can hardly be distinguished.

The function of the device is to enable the operator to note at a glance the operating conditions of the motor, as it is obvious that with too high a degree of temperature the indicating hand will warn the driver of trouble. Similarly, upon the cooling fluid attaining a temperature in the neighborhood of 32 degrees, the hand will indicate the need of attention to prevent freezing. The Stewart Auto Thermo-Meter is finished in brass or nickel and is moderately priced.

MOORE CHAIN HOIST.

The Chisholm & Moore Manufacturing Company, Cleveland, O., maker of chain hoists and trolleys, is marketing the Moore anti-friction chain hoist, produced in capacities from one-half to 10 tons and is provided with an improved automatic brake which locks the load at all points and yet permits of a very free and smooth lowering movement.

The brake is adjustable, permitting of lowering the load more freely, and all friction surfaces require no oiling as they are self-lubricating. The locking device is released by a slight reverse pull on the hand chain. The maker states that it has less working parts than any other hoist except the direct differential, and that spur gears are utilized.

The chains are made of the highest grade material and are tested and stretched to gauge on a pull of 100 per cent. greater than the maximum load they are intended to carry. The height of lift varies from eight feet for the half-ton hoist to 12 feet for the 10-ton equipment. By utilizing two extra feet of both main

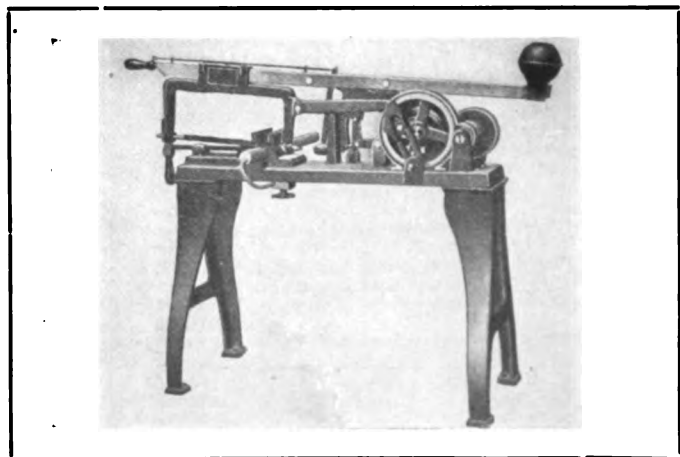
and hand chain, an additional foot may be obtained. The company will forward catalogues and price list free on request.

UNIVERSAL HACKSAW MACHINE.

Power hacksaws are time savers in the repair shop and service station, as not only is considerable time wasted in cutting metal by the hand tool, but with large pieces it is not always easy to make an accurate cut. The West Haven Manufacturing Company, West Haven, Conn., with postoffice address, New Haven, produces a line of hacksaw frames and blades, and is marketing the Universal hacksaw machine shown in an accompanying illustration. It has a capacity of six-inch solids, and one of the qualities of the equipment is the quick return of the stroke, this being 3:1. The blade also lifts entirely from the work on the return stroke.

The machine is designed especially for economy and speed. There are two fixed strokes, a five and a seven-inch, and only one adjustment is required; that is, for work above five inches in diameter or square. The maker states that the adjustment may be made in the short time of 15 seconds. Another feature of the machine is that the automatic lift is adjustable for wear. It is stated that the automatic stop is absolute, and that the pulley can be lubricated without throwing off the belt. The company calls special attention to the shafts of the machine, stating that these are silent, and being on the bed of the machine make for maximum service. All parts are interchangeable.

The size of the pulley employed is six by 1.75 inches and the speed is 240 revolutions a minute. The length of the saw blades is 12 and 14 inches. The floor space required is 52 by 16 inches; height of work vise, 28 inches, and height over all, 42 inches. The net weight is 240 pounds; gross, 300. All castings are



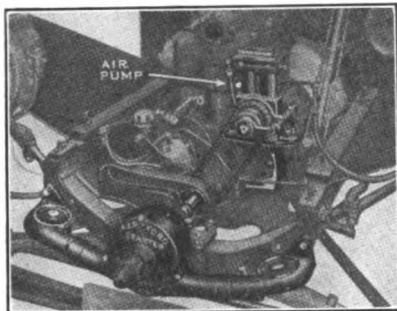
Universal Hacksaw Machine, Having Rapid Return of Stroke and Being Capable of Cutting Solids up to Six Inches in Diameter.

numbered, making for convenience when ordering spare parts. The company issues a catalogue of its products, which will be mailed free on request.

New Commercial Car Accessories

Kellogg Starter.

A compressed air type of motor starter for model T Ford cars is being marketed by the Kellogg Manufacturing



Company, Rochester, N. Y., maker of power tire pumps, etc. The system comprises in combination a pump and starting mechanism, storage tank, starter button and pump control. It is stated that the outfit is installed with no other work than the attaching of a bracket at the front of the machine and that it does not detract from the appearance of the car.

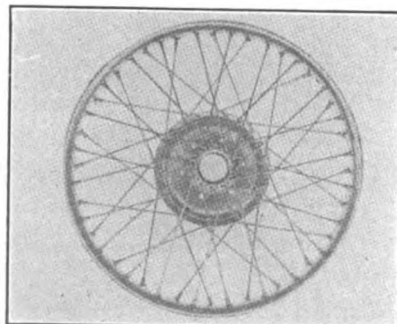
The unit comprises a cylinder, the piston of which is actuated by air entering from the tank at high speeds. A chain connected with the piston operates a drum in the housing mounted at the front end of the vehicle. This chain makes one complete turn around the drum. The fan belt pulley is replaced with a combination pulley, sprocket for driving the pump and a clutch which automatically engages with the motor when the starter is operated. The application of air is gradual, but the power developed during the balance of the piston travel is such as to spin the motor. A spring returns the drum, preparing it for a second application of energy. It is automatically performed.

All working parts are fully enclosed, and provision is made for inflating tires. Control of the pump for storing compressed air is by a button, and a similar member operates the starter. Several starts are held to be possible with one charging of the tank.

Stanweld Wire Wheel.

The Standard Welding Company, Cleveland, O., is manufacturing a design of wire wheels for attachment to the model T Ford car, and one of the qualities of the design is that it may be applied to both the front and rear by utilizing the old wooden wheel flange and bolts. The hub of the Stanweld is a steel stamping; the spokes are reinforced at both ends, and the three-cross method of lacing is employed.

The finish is two coats of black enamel baked on. Among the features emphasized in the wheels is lightness.



They come complete for attachment, and their application does not involve any other work than removing the old flange and bolts, and displacing the wooden wheel. Special tools are not required.

Auto Signalite.

The Auto Signalite Company, 735 Seventh avenue, New York City, is marketing the Auto Signalite, which differs from the usual signalling devices in that a small lever is employed to operate it. This lever is actuated by the driver, slightly in anticipation of stopping, turning to the right or left, or continuing in the original direction.

Combined with the signal is a tail light and number plate bracket, these being compactly arranged in a cylinder having dimensions of 5.5 by 12.5 inches. Ease of installation is emphasized by the maker. The device can be attached

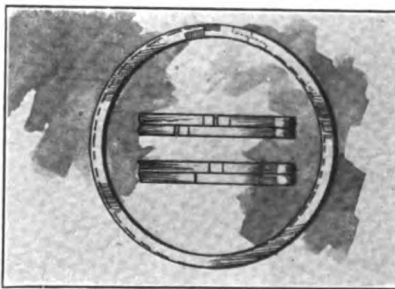


to any part of the rear of the vehicle. An electric light illuminates the words "Stop", "Right", "Left" and the red light.

Duplex Piston Ring.

M. L. Dunham, 140 West 52nd street, New York City, is manufacturing the Duplex piston ring. The maker states that when fitted to a piston the gas cannot pass the rings; that smoking is eliminated, and that the efficiency of the motor is improved. One of the qualities claimed for the Duplex is that wear does not affect the joints. It is also stated that it remains sealed at all times.

It is claimed that the tension of the

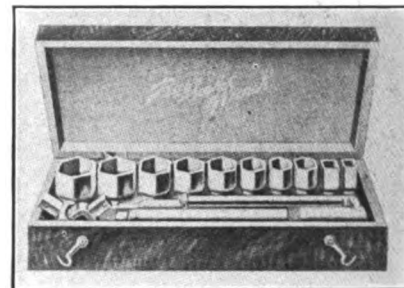


ring is balanced or even, and that its gas tight feature is obtained with a very light pressure. When in service the ring has an outward tension, also a double spiral tension; that is, the free ends not only exert a force outwardly, but expand radially in opposite directions around the cylinder wall, and will fit themselves to a worn or a new cylinder.

Ed. Note—The editor of this department invites manufacturers, distributors and agents to forward illustrations and descriptive matter of commercial vehicle accessories and equipment. The name of maker, city and street address should accompany all data. Photographs are preferable to drawings. Address all communications to this department of Motor Truck.

Ray Socket Wrench.

The Ray socket wrench is manufactured by the Packer Auto Specialty



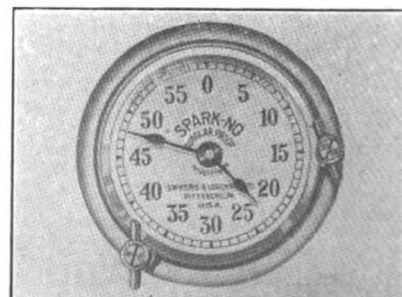
Company, Chicago, for which Ralph Walcott, 1790 Broadway, New York City, is distributor. The maker states that the wrench will fit every nut and bolt on a car, and may be utilized in places difficult of access with the conventional tool. The wrench proper is sturdily constructed and when utilized with the universal joint provided with each outfit, it is claimed that work may be accomplished at any angle up to 90 degrees.

The complete equipment includes, in addition to the wrench, which is nickel-plated and highly polished, a long extension bar, two short extension bars, one large and one small screw driver bit, one universal joint, one four-inch spark plug socket and 30 case hardened cold drawn steel sockets. These are graduated in sizes and fully guaranteed. This equipment comes in a wooden case, and the maker states that it will perform a variety of work as well as eliminate the necessity of carrying a large number of conventional tools. The company also manufactures a small set which differs from the larger member in that 11 sockets are provided in addition to the spark plug member. The smaller outfit comes either in a leather case or an oak box.

Spark-No Lock.

The H. W. Johns-Manville Company, New York City, is marketing the Spark-No lock, an ingenious device for locking the ignition of the car and preventing use of the machine by others than those intended. It is attached to the dash, and the hands are moved over a calibrated dial by means of two little knobs. These are employed for starting and operating. One of the qualities of the device is that it is impossible for anyone riding with the driver to discover the starting combination.

If anyone attempts to steal the machine, not only is the ignition cut off, but an alarm is sounded by a bell. The signal is also sounded if one tampers with the lock. The action of the device is similar to a combination lock, but differs in that the combination operates a switch, and this switch cannot be closed unless hands are properly set on dial. Spark-No Lock is moderately priced.



STANDARD BUILDERS OF GASOLINE TRUCKS.

Service Vehicles Produced for 1914, Giving the Name, the Manufacturer, the Location of the Principal Factory and Executive Office, and the Different Sizes of Machines Built in Capacities of Tons--A Complete Directory of the Industry of the United States.

Name	Manufacturer	Address	Models in tons capacity.
Available	Available Truck Co.	Chicago, Ill.	1
Armleder	O. Armleder Co.	Cincinnati, O.	1, 2, 2½ and 3
Auglaize	Auglaize Motor Car Co.	New Bremen, O.	¾, ¾ and 1
A. I. C.	American Ice Manufacturing Co.	New York City	5
Admiral	Admiral Motor Car Co.	St. Louis, Mich.	1½
Atterbury	Atterbury Motor Car Co.	Buffalo, N. Y.	¾, 1, 2, 3 and 5
Adams	Adams Bros. Co.	Findlay, O.	1, 1½ and 2
Avery	Avery Company	Peoria, Ill.	1, 2, 2, 3, 3 and 5
Autocar	Autocar Company	Ardmore, Penn.	1½
American	American Motor Truck Co.	Detroit, Mich.	1
A & R	Abendroth & Root Mfg. Co.	Newburgh, N. Y.	3, 4 and 5
Auburn	Auburn Motor Chassis Co.	Auburn, Ind.	¾ and 1½
Akron	Akron Motor Car & Truck Co.	Akron, O.	
Auto Tractor	Auto Tractor Co.	Niles, Mich.	
Buick	Buick Motor Co.	Flint, Mich.	½ and ¾
Blair	Blair Mfg. Co.	Newark, O.	1½, 2¼, 3½ and 5
Best	Durant-Dort Carriage Co.	Flint, Mich.	½
Barker	C. L. Barker	Norwalk, Conn.	1
Bauer	Bauer Machine Works Co.	Kansas City, Mo.	½ and ¾
Bessemer	Bessemer Motor Truck Co.	Grove City, Penn.	1 and 1½
Brown	Brown Commercial Car Co.	Peru, Ind.	¾
Lambert	Buckeye Mfg. Co.	Anderson, Ind.	¾, ¾, 1½ and 2
Butler	Huseltun Motor Co.	Butler, Penn.	¾
Beck	Cedar Rapids Auto Works.	Cedar Rapids, Ia.	½, 1, 2 and 3
Brookway	Brookway Motor Truck Co.	Cortland, N. Y.	¾, 1, 1 and 1½
B. A. Gramm	Gramm-Bernstein Motor Truck Co.	Lima, O.	1, 2, 3½ and 5
Baker	Baker & Bell Motor Truck Co.	Philadelphia, Penn.	
Best	Best Mfg. Co.	San Leandro, Cal.	½ and 1
Board	B. F. Board Motor Truck Co.	Alexandria, Va.	
Brooks	Brooks Latta Automobile Co.	St. Louis, Mo.	
Bucklen	H. E. Bucklin, Jr., Motor Truck Co.	Elkhart, Ind.	¾, 1½ and 2½
Buffalo	Buffalo Automobile Truck Co.	Buffalo, N. Y.	
Beaver	Beaver State Motor Truck Co.	Gresham, Ore.	
Brodesser	Brodesser Motor Truck Co.	Juneau, Wis.	
Couple-Gear	Couple-Gear Freight-Wheel Co.	Grand Rapids, Mich.	3½ and 6
Corbitt	Corbitt Automobile Co.	Henderson, N. C.	1
Crown	Crown Commercial Car Co.	North Milwaukee, Wis.	1 and 2
Coleman	Coleman Carriage & Harness Co.	Illon, N. Y.	1 and 2
Chase	Chase Motor Truck Co.	Syracuse, N. Y.	½, 1, 1½ and 2
Commerce	Commerce Motor Car Co.	Detroit, Mich.	½
Clark	Clark Delivery Car Co.	Chicago, Ill.	½
Cleveland	E. C. Clark Motor Co.	Jackson, Mich.	¾
Carrol	Carrol Motor Car Co.	Strassburg, Penn.	
Cincinnati	Cincinnati Motors Mfg. Co.	Cincinnati, O.	
Luck Utility	Cleburne Motor Mfg. Car Co.	Cleburne, Texas	½
Caldwell	Chautauqua Motor Co.	Dunkirk, N. Y.	
Continental	Continental Truck Mfg. Co.	Superior, Wis.	1 and 1½
Cooper	Cooper Machine Works.	Brooklyn, N. Y.	
Crawford	Crawford Automobile Co.	Hagerstown, Md.	¾
Crescent	Crescent Motor Co.	Middletown, O.	
Croce	Croce Auto Co.	Asbury Park, N. J.	
Croxton	Croxton Motor Car Co.	Washington, Penn.	
Christie	Front Drive Motor Co.	Hoboken, N. J.	
Curtis	Pittsburg Machine Tool Co.	Pittsburg, Penn.	
Danielson	Danielson Eng. Works.	Chicago, Ill.	¾
Dart	Dart Mfg. Co.	Waterloo, Ia.	½, 1 and 2
Dain	Dain Mfg. Co.	Ottumwa, Ia.	1
Dayton	Dayton Auto Truck Co.	Dayton, O.	¾, 1, 2, 3, 4, 5, 6, 7
De Kalb	De Kalb Wagon Works.	De Kalb, Ill.	2
Devon Tractor	Merchant & Evans.	Philadelphia, Penn.	4
Diamond T	Diamond T Motor Co.	Chicago, Ill.	½, 3 and 5
Dispatch	Dispatch Motor Car Co.	Minneapolis, Minn.	½
Dorris	Dorris Motor Car Co.	St. Louis, Mo.	¾, 2 and 3
Duryea	Duryea Motor Co.	Saginaw, Mich.	½ and 1½
Duplex	Duplex Power Car Co.	Charlotte, Mich.	2
Durocar	Durocar Mfg. Co.	Los Angeles, Cal.	1½
Duffy	Duffy Bros. Motor Truck Co.	San Francisco, Cal.	
Elk	Elk Motor Truck Co.	Charlestown, W. Va.	2, 3 and 5
Neustaedt	Neustaedt Motor Car Co.	St. Louis, Mo.	
Epperson	Epperson Commercial Truck Co.	St. Louis, Mo.	
Evans	Evans Motor Car Co.	Travers City, Mich.	
Ewing	Ewing Motor Truck Co.	Findlay, O.	
Fargo	Fargo Motor Car Co.	Chicago, Ill.	¾
Federal	Federal Motor Truck Co.	Detroit, Mich.	½
Four-Wheel Drive	Four-Wheel Drive Auto Co.	Clintonville, Wis.	½ and 3
Flint	Durant-Dort Carriage Co.	Flint, Mich.	¾
Fawrick	Fawrick Motor Car Co.	Sioux Falls, S. D.	½, ¾, 1 and 2
Gabriel	Gabriel Auto Co.	Cleveland, O.	
Garford	Garford Motor Car Co.	Elyria, O.	2, 3, 3, 5 and 6
Gay	S. G. Gay Co.	Ottawa, Ill.	¾ and 1
Geneva	Geneva Wagon Co.	Geneva, N. Y.	½ and 1½

Name	Manufacturer	Address	Models in Tons Capacity.
GMC	General Motors Truck Co.	Pontiac, Mich.	1, 2, 3½, 3½, 5, 5
Gramm	Gramm Motor Truck Co.	Walkerville, Ont.	1, 2 and 3½
G. A. Schacht	G. A. Schacht Motor Truck Co.	Cincinnati, O.	2
Gaylord	Gaylord Motor Car Co.	Gaylord, Mich.	
Great Southern	Great Southern Auto Co.	Birmingham, Ala.	
G. V.-Mercedes	General Vehicle Co.	Long Island City, N. Y.	6
Golden West	Golden West Motors Co.	Sacramento, Cal.	
Harvey	Harvey Motor Truck Works	Harvey, Ill.	1
Horner	Detroit-Wyandotte Motor Co.	Wyandotte, Mich.	1, 1½, 2, 3 and 5
Hupmobile	Hupp Motor Car Co.	Detroit, Mich.	½
Harder	Harder Auto Truck Co.	Chicago, Ill.	
Hatfield	Hatfield Auto Truck Co.	New York City	
Hexter	Roland Gas-Elec. Vehicle Co.	New York City	1½, 3½, 5 and 7
Ideal	Ideal Automobile Co.	Fort Wayne, Ind.	1, 1½ and 2½
IHC	International Harvester Co.	Chicago, Ill.	½ and ½
Indiana	Harwood-Barley Mfg. Co.	Marion, Ind.	1, 2 and 3
Internal Gear Drive	Internal Gear Drive Co.	Detroit, Mich.	
Imp	W. H. McIntyre Co.	Auburn, Ind.	¼
Jeffery	Thomas B. Jeffery Co.	Kenosha, Wis.	¾, 1 and 1½
Jarvis	Jarvis & Huntington Automobile Co.	Huntington, W. Va.	2, 3 and 5
Juno	Juno Motor Truck Co.	Juneau, Wis.	
Johnston	Johnston Motor Car Co.	Johnstown, Penn.	
KisselKar	Kissel Motor Car Co.	Hartford, Wis.	¾, 1, 1½, 2½, 3½, 6
Kalamazoo	Kalamazoo Motor Vehicle Co.	Kalamazoo, Mich.	1½
Kosmath	Kosmath Co.	Detroit, Mich.	½
Knickerbocker	Knickerbocker Motor Truck Co.	New York City	2½, 4 and 5
Kochler	H. J. Kochler S. G. Co.	New York City	1
Krebs	Krebs Commercial Car Co.	Clyde, O.	½, ¾, 1 and 1½
Kearns	Kearns Motor Truck Co.	Beavertown, Penn.	¾
Kelly	Kelly-Springfield Motor Truck Co.	Springfield, O.	1, 2, 3 and 5
King	A. R. King Mfg. Co.	Kingston, N. Y.	3½
Knox	Knox Automobile Co.	Springfield, Mass.	2, 3, 10 and 20
Kopp	Kopp Motor Truck Co.	Buffalo, N. Y.	1½, 3 and 5
Krickworth	Krickworth Motor Truck Co.	Chicago, Ill.	
Kleiber	Kleiber Co.	San Francisco, Cal.	
La France	American-La France Fire Eng. Co.	New York City	5 and 6
Landshaft	Wm. Landshaft & Sons	Chicago, Ill.	¾ and 1½
Lange	Lange Motor Truck Co.	Pittsburg, Penn.	1, 1½ and 2
Lewis	Lewis Motor Truck Co.	San Francisco, Cal.	2½, 3 and 5
Lippard-Stewart	Lippard-Stewart Motor Car Co.	Buffalo, N. Y.	¾ and 1½
Light	Light Commercial Car Co.	New York City	½ and ½
Little Giant	Chicago Pneumatic Tool Co.	Chicago, Ill.	1 and 1
Locomobile	Locomobile Co. of America	Bridgeport, Conn.	5
Longest	Longest Bros. Co.	Louisville, Ky.	3
Lord Baltimore	Lord Baltimore Motor Truck Co.	Baltimore, Md.	1 and 2
Lauth-Juergens	Lauth-Juergens Motor Car Co.	Fremont, O.	1, 2, 3 and 5
Lincoln	Lincoln Motor Car Works	Chicago, Ill.	½
La Crosse	La Crosse Motor Truck Co.	La Crosse, Wis.	
Mack	International Motor Co.	New York City	1, 5 and 6
Maccarr	Maccarr Co.	Scranton, Penn.	¾, 1, 1½ and 2
Mals	Mals Motor Truck Co.	Indianapolis, Ind.	1½, 2, 2½ and 3
Marmon	Nordyke & Marmon Mfg. Co.	Indianapolis, Ind.	¾
Martin	Martin Carriage Works	York, Penn.	1, 1½, 2½ and 4
Menominee	D. F. Poyer Co.	Menominee, Mich.	¾, 1 and 1½
Mercury	Mercury Mfg. Co.	Chicago, Ill.	½
Modern	Bowling Green Motor Car Co.	Bowling Green, O.	¾, 1 and 1½
Monitor	Monitor Automobile Works	Janesville, Wis.	½ and 1
Mora	Mora Power Wagon Co.	Cleveland, O.	1
Moore	Pacific Metal Products Co.	Los Angeles, Cal.	1½, 2, 3, 4 and 5
Moon	Jos. W. Moon Buggy Co.	St. Louis, Mo.	½ and 1½
Miller	Miller Car Co.	Detroit, Mich.	½
Mogul	Mogul Motor Truck Co.	St. Louis, Mo.	2, 2, 4, 6 and 6
Moreland	Moreland Motor Truck Co.	Los Angeles, Cal.	¾, 2 and 5
Morton	Morton Truck & Tractor, Inc.	Harrisburg, Penn.	2, 3, 5 and 10
Motokart	Tarrytown Motor Car Co.	New York City	¼
McIntyre	W. H. McIntyre Co.	Auburn, Ind.	½, 1, 2, 3 and 5
Marinette	Marinette Motor Car Co.	Marinette, Wis.	½
Merchants	Merchants Automobile Co.	Chicago, Ill.	
Metropolitan	Metropolitan Automobile Co.	Chicago, Ill.	
	Motor Vehicle Const. Co.	Sewaren, N. J.	
Muelhauser	Muelhauser Machine Co.	Cleveland, O.	
Maxim	Maxim Tri-Car Co.	Port Jefferson, N. Y.	
Moore	Moore Motor Truck Co.	Philadelphia, Penn.	
Mobillette	Woods Mobillette Co.	Chicago, Ill.	
Natco	National Motor Truck Co.	Bay City, Mich.	1
Nelson LeMoon	Nelson & LeMoon	Chicago, Ill.	1, 2 and 3
Nevada	Nevada Mfg. Co.	Nevada, Ia.	3
New York	Tegetmeier & Rlepe Co.	New York City	1½
New Haven	New Haven Truck & Auto Works	New Haven, Conn.	
O. K.	Star-Tribune Motor Sales Co.	Detroit, Mich.	½ and 1
Overland	Willys-Overland Co.	Toledo, O.	½
Ohio	Ohio Mfg. Co.	Upper Sandusky, O.	
Old Reliable	Old Reliable Motor Truck Co.	Chicago, Ill.	3 and 5
Owosso	Owosso Motor Co.	Owosso, Mich.	
Packard	Packard Motor Car Co.	Detroit, Mich.	2, 3, 4, 5 and 6
Palmer-Moore	Palmer-Moore Co.	Syracuse, N. Y.	¾
Pathfinder	Motor Car Mfg. Co.	Indianapolis, Ind.	1
Perfex	Perfex Co.	Los Angeles, Cal.	½
Palmer	Palmer-Meyer Motor Car Co.	St. Louis, Mo.	1 and 1½
Pope-Hartford	Pope Mfg. Co.	Hartford, Conn.	3 and 5
Peerless	Peerless Motor Car Co.	Cleveland, O.	3, 4, 5 and 6
Pierce-Arrow	Pierce-Arrow Motor Car Co.	Buffalo, N. Y.	2 and 5
Parsons	F. W. Parsons Co.	Newton, Ia.	
Phoenix	Phoenix Auto Works	Phoenixville, Penn.	
Plymouth	Plymouth Motor Truck Co.	Plymouth, O.	1 and 2
Reo	Reo Motor Truck Co.	Lansing, Mich.	2

Name	Manufacturer	Address	Models in Tons Capacity.
Rockford	Rockford Motor Truck Co.	Rockford, Ill.	$\frac{3}{4}$ and 2
Republic	Alma Motor Truck Co.	Alma, Mich.	$\frac{3}{4}$
Rogers	Rogers Motor Car Co.	Omaha, Neb.	
Rowe	Rowe Motor Co.	Coatesville, Penn.	$\frac{3}{4}$, 1, 1 $\frac{1}{2}$, 2, 3, 5
Sanford	Sanford Motor Truck Co.	Syracuse, N. Y.	1 and 1 $\frac{1}{2}$
Selden	Selden Motor Vehicle Co.	Rochester, N. Y.	1
Service	Service Motor Car Co.	Wabash, Ind.	1 $\frac{1}{2}$, 2 and 3
Signal	Signal Motor Truck Co.	Detroit, Mich.	$\frac{3}{4}$
Siebert	Shop of Siebert	Toledo, O.	$\frac{3}{4}$
Speedwell	Speedwell Motor Car Co.	Dayton, O.	1, 4 and 6
Standard	Standard Motor Truck Co.	Detroit, Mich.	3 and 4
Star	Star Motor Car Co.	Ann Arbor, Mich.	1 and 1 $\frac{1}{2}$
Stearns	F. B. Stearns Co.	Cleveland, O.	5
Stegeman	Stegeman Motor Car Co.	Milwaukee, Wis.	$\frac{3}{4}$, 1, 2, 3 and 4
Stewart	Stewart Motor Corp.	Buffalo, N. Y.	$\frac{3}{4}$
Sternberg	Sternberg Mfg. Co.	Milwaukee, Wis.	2, 2 $\frac{1}{2}$, 3, 4, 5, 6, 7
Studebaker	Studebaker Corp.	Detroit, Mich.	$\frac{3}{4}$
Sullivan	Sullivan Motor Car Co.	Rochester, N. Y.	1
Standard	Standard Motor Truck Co.	Cleveland, O.	1 and 1 $\frac{1}{2}$
Stanley	Stanley Motor Carriage Co.	Newton, Mass.	$\frac{3}{4}$ and 1
Superior	F. G. Clark Co.	Lansing, Mich.	
St. Louis	St. Louis Motor Truck Co.	St. Louis, Mo.	
Sandusky	Sandusky Auto Parts & Motor Co.	Sandusky, O.	1 and 2
Schleicher	Schleicher Motor Vehicle Co.	New York City	2, 3 and 5
Schmidt	Schmidt Bros.	Chicago, Ill.	$\frac{1}{2}$ and $\frac{3}{4}$
Smith	A. O. Smith Co.	Milwaukee, Wis.	3 $\frac{1}{2}$ and 5
Spoerer	Spoerer's Sons Co.	Baltimore, Md.	
Stapf	Stapf & Co.	Dunkirk, N. Y.	
Swanson	Swanson Motor Car Co.	Chicago, Ill.	
Sower	Sowers Motor Truck Co.	Boston, Mass.	1 $\frac{1}{2}$
Toledo	Toledo Motor Truck Co.	Toledo, O.	
Transit	Transit Motor Car Co.	Louisville, Ky.	2, 3 $\frac{1}{2}$ and 5
Trabold	Trabold Truck Co.	Johnstown, Penn.	$\frac{3}{4}$, 1, 1 $\frac{1}{2}$ and 2
Twin City	Brasle Mfg. Co.	Minneapolis, Minn.	1
Tiffin	Tiffin Wagon Co.	Tiffin, O.	$\frac{1}{2}$, 1 and 2
Toepfner	Toepfner Bros.	Bay City, Mich.	
Triumph	Triumph Motor Car Co.	Chicago, Ill.	1 $\frac{1}{2}$
Tulsa	Tulsa Auto. & Mfg. Co.	Tulsa, Okla.	$\frac{3}{4}$, 1 and 1 $\frac{1}{2}$
Tuttle	Tuttle Mfg. Co.	Canastota, N. Y.	
Universal	Universal Motor Truck Co.	Detroit, Mich.	1 $\frac{1}{2}$ and 3
U. S.	U. S. Motor Truck Co.	Cincinnati, O.	2 and 3
Universal	Universal Motor Co.	Denver, Col.	
Union	Union Motor Truck Co.	San Francisco, Cal.	2
Vellie	Vellie Motor Car Co.	Moline, Ill.	2 and 3
Veerac	Veerac Motor Co.	Anoka, Minn.	1
Vulcan	Driggs-Seabury Ordnance Corp.	Sharon, Penn.	2, 3, 4, 4 $\frac{1}{2}$, 5 and 7
Van Winkle	Van Winkle Motor Truck Co.	Atlanta, Ga.	
Victor	Victor Auto. Mfg. Co.	St. Louis, Mo.	
Wade	Wade Commercial Car Co.	Holly, Mich.	$\frac{1}{2}$
Willys Utility	Willys-Overland Co.	Lima, O.	1
Wichita	Wichita Falls Motor Co.	Wichita Falls, Tex.	$\frac{3}{4}$ and 3
Willet	Willet Engine & Truck Co.	Buffalo, N. Y.	$\frac{3}{4}$
Wagenhals	Wagenhals Motor Co.	Detroit, Mich.	$\frac{1}{2}$
Ware	Ware Motor Vehicle Co.	St. Paul, Minn.	3 $\frac{1}{2}$
White	White Company	Cleveland, O.	$\frac{3}{4}$, 1, 1 $\frac{1}{2}$, 3 and 5
Witt-Will	Witt-Will Co.	Washington, D. C.	1, 2 and 4
Wilcox	H. E. Wilcox Motor Car Co.	Minneapolis, Minn.	1, 2 and 3
Walter	Walter Motor Truck Co.	New York City	1 $\frac{1}{4}$, 2, 3, 3 $\frac{1}{2}$, 4
Washington	Washington Motor Car Company	Hyattsville, Md.	5, 5, 6 and 7
Westman	Westman Motor Truck Co.	Cleveland, O.	
White Star	White Star Motor & Engineering Co.	Brooklyn, N. Y.	2, 3 and 5
Zimmerman	Zimmerman Mfg. Co.	Auburn, Ind.	$\frac{1}{2}$

PLANT OFFERED TO MARSHALL.

The Board of Commerce of Marshall, Mich., and business men of that city are considering the proposal made them by Murray Irwin, sales manager of the Lewis Spring & Axle Company, Jackson, Mich., which, if accepted, will result in the establishment of a plant at Marshall to construct the Irwin wagon, which is now produced by the company he represents. The facilities at Jackson are limited and as the purpose is to construct the machine in considerable numbers, a separate factory is desired. The machine is 1500 pounds capacity and is sold for a moderate price. The Marshall interests are asked to subscribe half of the capital stock of \$65,000, and of this \$10,000 is to be devoted to the payment of patents, designs, materials, etc.

WILL BUILD MILLER WAGONS.

The Kosmath Company, manufacturers' representative, 707 Ford building, Detroit, Mich., which markets the Kosmath delivery wagon, has made announcement that it has purchased from the receiver of the Miller Car Company the designs and material which that concern had on hand when it failed. The Miller company was building a 1000-pound delivery wagon. The Kosmath Company has transferred the designs and material to its factory in Detroit, where it purposes to continue the manufacture of these machines.

The annual meeting of the stockholders of the United States Rubber Company will take place March 17 at New Brunswick, N. J., at which time the annual reports will be made and officers elected.

SPECIFICATIONS OF 1914 MOTOR TRUCKS.

The Principal Dimensions and the Important Details of Construction and Mechanical Equipment of 312 Different Sizes or Types of Service Wagons Produced by 137 of the Leading Manufacturers of the American Industry.

THE motor service vehicle industry is, as is any other industrial classification, constantly in transition. By this is meant that new enterprises are being promoted and developed, others are in the course of liquidation, some are especially active and others are for the time being dormant, so that there is at all times a rather uncertain standard if one were to judge by numbers. If one were to make comparison and determine the progression or retrogression by the count of those firms that may be rated as productive, there would undoubtedly be wide variance from actual facts.

There are assumed to be approximately 250 firms representing the entire industry, but of these a large proportion cannot be regarded as productive. Many of them have been merely projected, others have perhaps built a single vehicle, and still others have engaged in manufacturing in a limited way and market their productions in a small area, in some instances doing business direct from the factory to the customers.

A list of those doing business as builders of service vehicles will indicate that the industry is very generally distributed throughout the country, and that there

has been decided increase in manufacture of motor trucks in the Western and Pacific Coast states.

Specifications as offered to the people have a definite and useful purpose, for they afford accurate knowledge of differing dimensions that are of material importance to those considering purchasing. These specifications are generally prepared to meet the convenience of the individual compiling them, and if there is any criticism to be made of the average catalogue presentation it is from the fact that it will not contain all of the detail that may be useful. That is, the manufacturers have never united upon any uniform manner of informing the people of the engineering data of what they have to sell.

There are undoubtedly good reasons for variance of opinion as to literature for publicity and promotive purposes, but the value of uniformity can be best understood by those who make comparison of two catalogues with a view of learning the main details of construction. Information of real worth is neglected and that which is inconsequential is exploited, a statement that can be substantiated in a general way.

The chief value of specifications is in uniformity of

Specifications of Three Hundred and Twelve Gaso

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Adams, A.	2,000	\$1,850	121-96	Solid...	36x24	36x6	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear...	Pump...	Cushion.
Adams, D.	3,000	2,300	126	Solid...	36x24	36x6	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear...	Pump...	Cushion.
Adams, E.	4,000	2,500	140	Solid...	36x4	36x6	Under hood.	4	3.875x5.000	24.00	L-head...	Block...	Right...	Gear...	Pump...	Cushion.
Admiral, C.	3,000	1,475	125	Solid...	36x24	36x6	Under hood.	4	3.800x5.000	19.60	L-head...	Block...	Right...	Gear...	Thermo...	Spring...
A. I. C., C.	10,000	3,500	126	Solid...	36x6	40x6	Under hood.	4	4.250x6.750	26.80	L-head...	Pairs...	Left...	Gear...	Pump...	Spring...
Anglais, H.	2,000	950	96	Solid...	36x2	36x2	Under seat.	2	5.250x4.000	22.00	L-head...	Sep...	Right...	Gear...	Thermo...	...
Anglais, G.	2,000	1,350	110	Solid...	36x2	36x24	Under hood.	4	3.800x5.000	19.60	L-head...	Block...	Right...	Gear...	Thermo...	...
Armstrong, B.	2,000	2,300	126	Solid...	40x4	40x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear...	Pump...	Spring...
Armstrong, H.	4,000	2,150	136-60	Solid...	40x4	40x3	Under hood.	4	4.500x5.000	32.40	L-head...	Block...	Right...	Gear...	Pump...	Spring...
Armstrong, E.	5,000	2,500	136-60	Solid...	40x4	40x3	Under hood.	4	4.500x5.000	32.40	L-head...	Block...	Right...	Gear...	Pump...	Spring...
Atterbury, A.	1,500	.....	118	Pneu...	34x4	34x4	Under hood.	4	3.800x5.000	19.60	L-head...	Block...	Right...	Gear...	Thermo...	S & T...
Atterbury, B.	2,000	.....	128	Solid...	36x24	36x4	Under seat.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	S & T...
Atterbury, C.	4,000	.....	143	Solid...	36x24	36x24	Under hood.	4	4.250x5.500	28.90	L-head...	Block...	Left...	Gear...	Pump...	S & T...
Atterbury, D.	8,000	.....	153	Solid...	36x4	36x4	Under hood.	4	4.875x5.500	35.00	T-head...	Pairs...	Opp...	Gear...	Pump...	S & T...
Atterbury, E.	10,000	.....	163	Solid...	36x5	42x6	Under hood.	4	4.875x5.500	35.00	T-head...	Pairs...	Opp...	Gear...	Pump...	S & T...
Autocar, F.	3,000	.....	97	Opt...	34x4	34x5	Under seat.	2	4.750x4.500	18.00	L-head...	Sep...	Side...	Gear...	Pump...	Spring...
Available, 25.	2,000	1,350	120	Solid...	36x2	36x24	Under floor.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Spring...
Avery, C-1.	2,000	1,600	128	Solid...	34x24	34x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Spring...
Avery, B-2.	4,000	2,700	128	Solid...	36x4	36x24	Under seat.	4	4.750x5.000	36.10	L-head...	Sep...	Left...	Gear...	Pump...	Spring...
Avery, B-3.	6,000	3,200	128	Solid...	38x5	38x4	Under seat.	4	4.750x5.000	36.10	L-head...	Sep...	Left...	Gear...	Pump...	Spring...
Avery, A-3.	6,000	3,200	140	Wood...	.....	.....	Under seat.	4	4.750x5.000	36.10	L-head...	Sep...	Left...	Gear...	Pump...	Spring...
Avery, B-5.	10,000	4,500	140	Solid...	38x6	38x5	Under seat.	4	5.250x5.750	44.10	T-head...	Pairs...	Opp...	Gear...	Pump...	Spring...
Barker, U.	2,000	2,000	130	Solid...	42x24	42x5	Under hood.	4	4.000x5.000	25.60	L-head...	Block...	Right...	Gear...	Opt...	Spring...
Bauer, A & C.	1,000	1,000	96	Solid...	36x2	36x2	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...
Bauer, B & D.	1,500	1,000	96	Solid...	36x2	36x2	Under hood.	4	3.750x5.000	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Rigid...

**Drives on four wheels.

ABBREVIATIONS:—Tires: Pneu, pneumatic; *, dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point. Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.

presentation, that there will be the largest measure of information compatible with the opportunity for publicity, and in this connection it is well to emphasize that no matter how presented the specifications of a given type of machine are the same data, the main variance being in the manner of compilation. That is, the dimensions and proportions will not vary because of differing statements relative to them, and for this reason a given tabulation that contains the main facts will have practically the same information that will be found in any other, although the arrangement of the two will be entirely different.

As a matter of fact arrangement is a matter of personal opinion with the person making the compilation, and aside from an individual view to systematic presentation or convenience in reading one may be said to be equal to any other that contains similar information. There is, however, a decided advantage in the form of tabulation that will permit the greatest volume of information in a given space. The specification table that would contain every fact worthy of consideration by the engineer would necessarily be far more complete and comprehensive than that which would meet the ordinary requirements of those seeking general data. For this reason, as well as from lack of space primarily, it is impossible to give more than a few of the principal facts concerning a large number of machines.

The following tabulation, which is reproduced by the MOTOR TRUCK through the courtesy of the Commercial Vehicle, New York City, can be commended to the reader for its completeness and the

thoroughness of compilation. Practically every detail has been supplied, and the table from the aspect of the most critical is comprehensive, for all important data are presented uniformly, making possible an extremely wide range of accurate comparison. It shows 32 essential facts of the mechanical construction of practically every one of the 312 different types of American machines included in it, and in addition gives the completed chassis price of each.

Considering the value of this table further, it will be noted that it contains the names of 137 different makes of vehicles, giving all the models or types marketed by the names stated, and the number produced by any one maker ranges from one to seven, and it is interesting to observe that of the makes tabulated 59 builders produce one model, 35 build two, 20 build three, seven build four, 10 build five, four build six and two build seven. The capacities range from 400 to 14,000 pounds. It will be noted from the list that precedes this statement that a considerable number regarded as manufacturers are not included in these specifications. This fact prompts the comment that the firms whose machines are named in the following tables may be regarded as active and more or less factors in the industry.

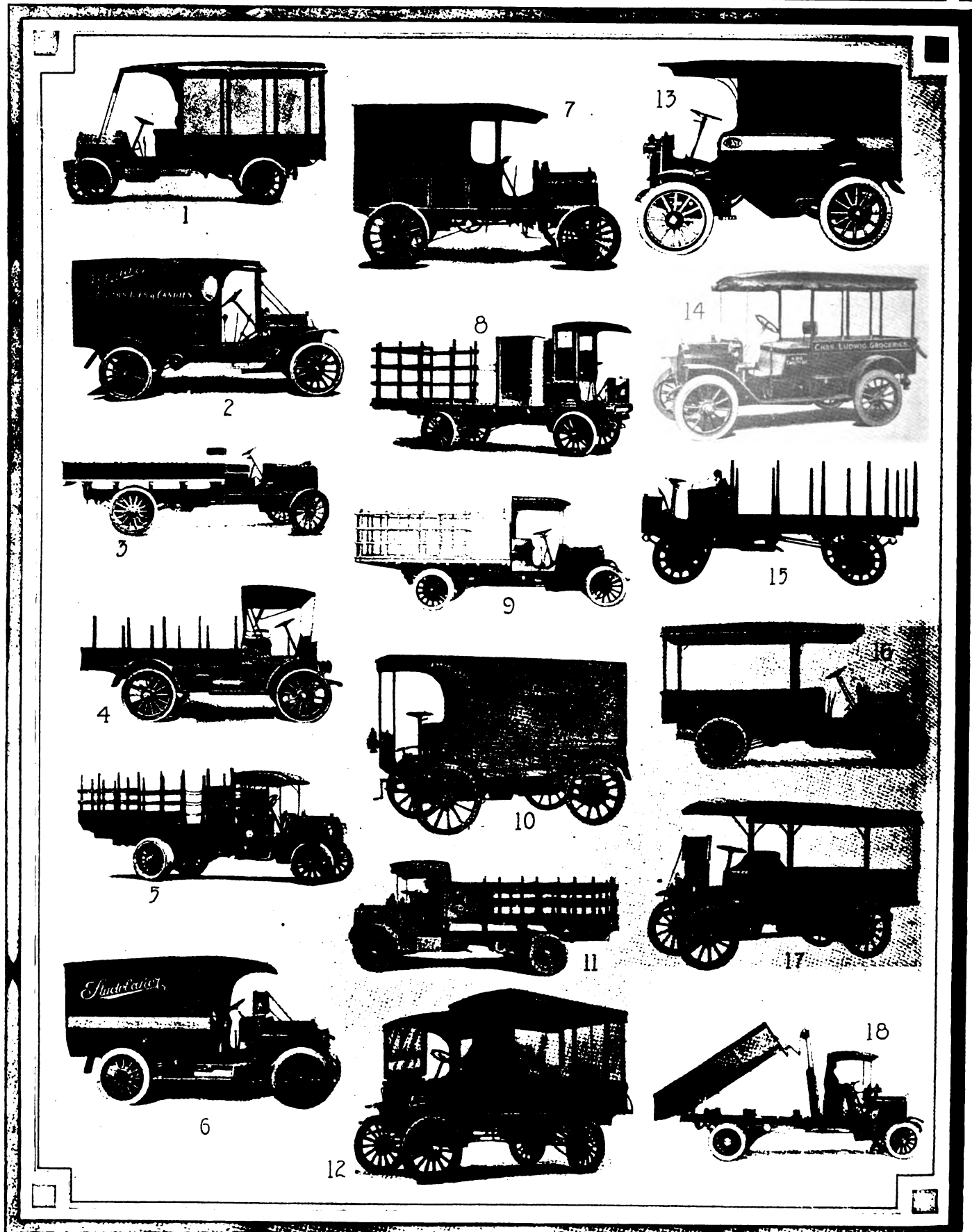
The magnitude of the individual firms and the volume of their business is not represented by the specifications, but the tabulation includes practically every concern of importance in the industry. The reader can refer to any make of vehicle by the trade names, which are arranged alphabetically, and in the order of load capacity where more than one size is built.

line Commercial Vehicle Chassis in Tabulated Form

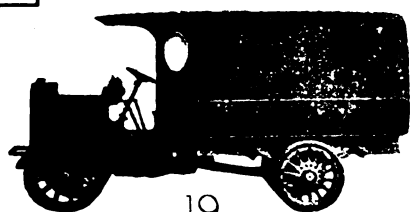
IGNITION			Carbureter	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset		Rear Axle
			Type	Location		No. Forw'd Speeds	Front	Rear			Steering	Gear-Shift					
Sing.	Eisemann	Hand	Schebler	Spl-Pres	Diak	Sel.	Amid.	3	7.45-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Opt.	Adams, A
Sing.	Eisemann	Hand	Schebler	Spl-Pres	Diak	Sel.	Amid.	3	7.45-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Opt.	Adams, D
Sing.	Eisemann	Hand	Schebler	Spl-Pres	Diak	Sel.	Amid.	3	7.45-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Opt.	Adams, E
Sing.	Boech	Fixed	Schebler	Spl-Pres	Cone	Sel.	Unit J.	3		Chain	Ell.	Ell.	Left.	Center.	Roll	Roll	Admiral, J
Sing.	Simms	Hand	Holley	Splash	Cone	Sel.	Amid.	4	8.00-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	A. I. C., C
Dual.	Remy	Gov.	Schebler	Spl-Pres	Diak	Plan.	Unit J.	2	4.00-1	Chain	Ell.	Ell.	Right.	Right.	Plain	Roll	Anglaize, H
Dual.	Remy	Hand	Schebler	Spl-Pres	Diak	Sel.	Unit M.	3	4.00-1	Int G.	Ell.	Ell.	Left.	Center.	Plain	Roll	Anglaize, G
Sing.	Boech	Hand	Schebler	Splash	Diak	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Left.	Center.	Ball	Ball	Armleder, B
Sing.	Boech	Hand	Schebler	Splash	Diak	Sel.	Amid.	3	8.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Ball	Armleder, H
Sing.	Boech	Hand	Schebler	Splash	Diak	Sel.	Amid.	3	8.00-1	Chain	Ell.	Ell.	Left.	Center.	Ball	Plain	Armleder, E
Sing.	Boech	Fixed	Stromberg	Spl-Pres	Diak	Sel.	Unit M.	3	6.00-1	T Worm	Ell.	Ell.	Left.	Center.	Ball	Roll	Atterbury, A
Sing.	Boech	Fixed	Stromberg	Spl-Pres	Diak	Sel.	Unit M.	3	6.75-1	T Worm	Ell.	Ell.	Left.	Center.	Ball	Roll	Atterbury, B
Dual.	Boech	Hand	Stromberg	Spl-Pres	Diak	Sel.	Unit M.	3	Opt.	Opt.	Ell.	Ell.	Left.	Center.	Ball	Roll	Atterbury, C
Dual.	Boech	Hand	Stromberg	Spl-Pres	Diak	Sel.	Unit J.	3	8.40-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Atterbury, D
Dual.	Boech	Hand	Stromberg	Spl-Pres	Diak	Sel.	Unit J.	3	8.40-1	Chain	Ell.	Ell.	Right.	Right.	Roll	Roll	Atterbury, E
Sing.	Boech	Fixed	Stromberg	Spl-Pres	Diak	Prog.	Amid.	3	7.10-1	Bevel	Ell.	Plat.	Right.	Right.	Roll	Roll	Autocar, F
Dual.	Briggs	Hand	Schebler	Splash	Cone	Sel.	Unit J.	3	6.00-1	Chain	Ell.	Ell.	Left.	Left.	Ball	Ball	Available, 25
Dual.	Heinze	Hand	Rayfield	Spl-Pres	Diak	Sel.	Unit M.	3	7.95-1	Chain	Ell.	Ell.	Left.	Center.	Roll	Roll	Avery, C-1
Dual.	Eisemann	Auto	Rayfield	Spl-Pres	Diak	Sel.	Unit J.	3	18.00-1	Chain	Ell.	Ell.	Right.	Center.	Roll	Roll	Avery, B-2
Dual.	Eisemann	Gov.	Schebler	Splash	Diak	Sel.	Amid.	3	13.73-1	Chain	Ell.	Ell.	Right.	Center.	Roll	Roll	Avery, B-3
Dual.	Eisemann	Gov.	Schebler	Splash	Diak	Sel.	Amid.	3	13.73-1	Chain	Ell.	Ell.	Right.	Center.	Roll	Plain	Avery, A-3
Dual.	Eisemann	Gov.	Schebler	Spl-Pres	Diak	Sel.	Unit M.	3	9.90-1	Chain	Ell.	Ell.	Right.	Center.	Roll	Roll	Avery, B-5
Sing.	Eisemann	Fixed	Stromberg	Spl-Pres	Diak	Sel.	Unit M.	4	8.60-1	T Worm	Ell.	Ell.	Left.	Center.	Ball	Ball	Barker, U
Doub.	Opt.	Hand	Schebler	Splash	Diak	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Right.	Center.	Ball	Roll	Bauer, A & C
Doub.	Opt.	Hand	Schebler	Splash	Diak	Sel.	Unit M.	3	5.00-1	Bevel	Ell.	Ell.	Right.	Center.	Ball	Roll	Bauer, B & D

ABBREVIATIONS: Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fris, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: Ell, semi-elliptic; Ell, elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.

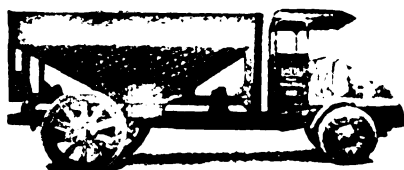
Typical Models of American Motor Wagons



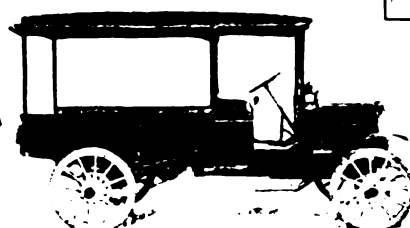
Trucks That Are Standards for 1914 Production.



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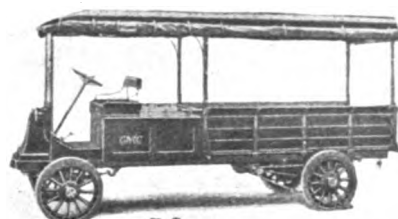
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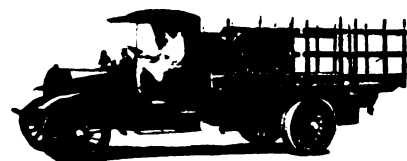
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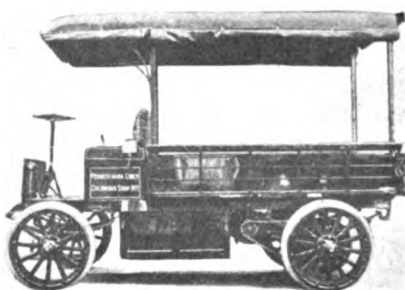
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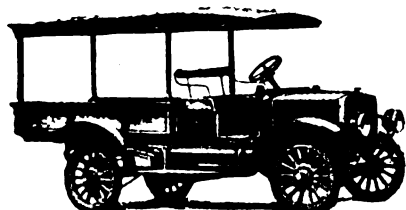
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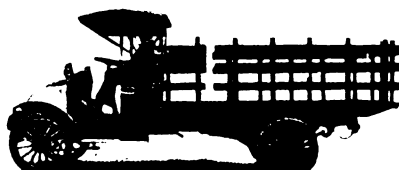
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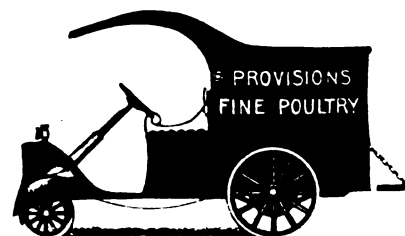
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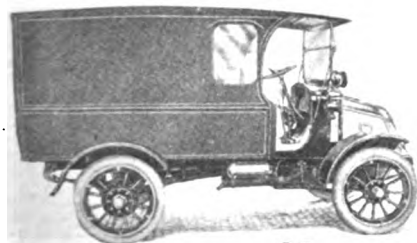
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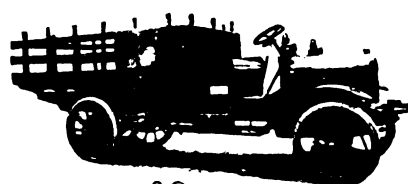
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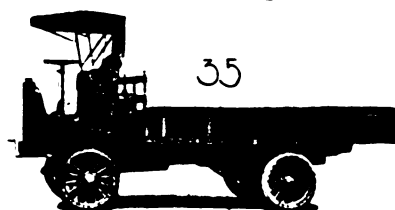
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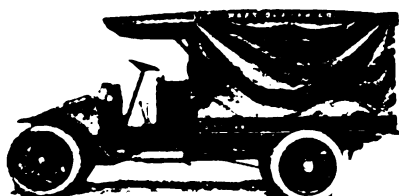
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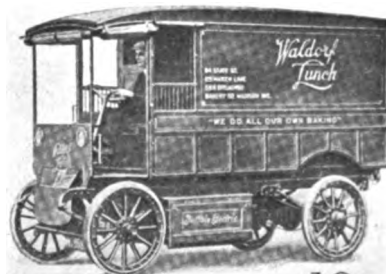
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Specifications of Three Hundred and Twelve Gaso

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Bessemer, C	1,000	1,250	103	Solid	34x2	34x3	Under hood	4	3.500x4.500	19.60	L-head	Block	Left	Gear	Thermo	S & T
Bessemer, B	4,000	1,800	120	Solid	34x3	34x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Thermo	S & T
Bessemer, A	6,000	2,100	136	Solid	34x4	34x5	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Thermo	S & T
Best, A	1,000	750	78	Opt	32x2	34x2	Under floor	2	4.500x4.500	16.20	L-head	Sep	Head	Gear	Thermo	Springs
Best, C	1,600	1,370	106	Opt	35x3	35x3	Under hood	4	3.750x4.500	22.50	L-head	Block	Right	Hel'l	Thermo	Springs
Blair, C	4,000	2,850	114-21	Solid	34x4	34x3*	Bet seats	4	4.250x5.250	28.90	L-head	Block	Left	Hel'l	Pump	Springs
Blair, D	5,000	3,250	121-44	Solid	34x4	36x3*	Bet seats	4	4.500x5.500	32.40	L-head	Pairs	Left	Hel'l	Pump	Springs
Blair, E	7,000	3,750	135-44	Solid	36x5	36x4*	Bet seats	4	4.500x5.500	37.40	L-head	Pairs	Left	Hel'l	Pump	Springs
Brown	1,500	1,650	122	Cush	34x4	34x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Buckeye, V-1	800	900	106	Pneu	30x3	31x4	Under hood	4	3.500x4.250	19.60	L-head	Block	Left	Gear	Pump	Springs
Buckeye, V-2	1,500	1,125	114	Opt	35x3	35x3	Under hood	4	3.750x4.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Buckeye, V-4	3,000	1,900	120	Solid	36x3	36x4	Under hood	4	4.500x5.000	32.40	L-head	Pairs	Left	Gear	Pump	Springs
Buckeye, V-5	4,000	2,200	120	Solid	36x4	36x5	Under hood	4	4.500x5.000	32.40	L-head	Pairs	Left	Gear	Pump	Springs
Buick, 3	1,000	1,000	100	Pneu	33x4	33x4	Under hood	4	3.000x5.000	14.40	L-head	Block	Right	Gear	Thermo	Rigid
Buick, 4	1,500	1,125	122	Pneu	35x5	35x5	Under hood	4	3.000x5.000	14.40	L-head	Block	Right	Gear	Thermo	Rigid
Butler, 1914	1,500	1,650	128	Pneu	35x4	35x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Cushions
Chase, D	1,000	855	106	Solid	36x2	36x2	Under hood	3	4.125x4.000		2-cycle	Sep			Air	
Chase, K	2,000	1,350	106	Solid	36x2	36x3	Under hood	3	4.125x4.000		2-cycle	Sep			Air	
Chase, H	2,000	1,200	106	Solid	36x2	36x3	Under hood	3	4.125x4.000		2-cycle	Sep			Air	
Chase, L	3,000	1,675	112	Solid	36x3	36x3	Under hood	3	4.500x5.000		2-cycle	Sep			Air	
Chase, J	4,000	2,100	120	Solid	36x3	36x4	Under hood	3	4.500x5.000		2-cycle	Sep			Air	
Coleman, B	2,000	1,950	107	Solid	36x3	36x4	Under seat	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Springs
Coleman, C	4,000	2,400	117	Solid	36x4	36x3*	Under seat	4	4.250x5.250	28.90	L-head	Sep	Left	Gear	Pump	Springs
Commerce, Del	1,000	875	104	Solid	32x3	33x4	Under hood	4	3.000x4.500	14.40	L-head	Block	Right	Gear	Thermo	Rigid
Continental	3,000	1,850	110	Solid	36x3	40x3	Under hood	4	4.000x	25.60					Pump	
Corbett, F	2,500	2,000	130	Solid	36x3	40x4	Under hood	4	3.750x5.000	22.50	L-head	Block	Left	Gear	Pump	Springs
Couple-Gear, A C T**	12,000	5,800	144	Solid	36x5	36x5*	Under seat	4	5.750x6.000	53.00	T-head	Sep	Opp	Gear	Pump	Springs
Couple-Gear, A C T**	12,000	5,550	144	Solid	36x5	36x5*	Under seat	4	5.750x6.000	53.00	T-head	Sep	Opp	Gear	Pump	Springs
Crown, B	2,000	2,300	135	Solid	34x3	35x5	Under hood	4	4.000x5.000	25.60	L-head	Block	Left	Gear	Pump	Springs
Crown, C	4,000	3,000	150	Solid	34x4	38x4*	Under hood	4	4.250x5.000	28.90	T-head	Pairs	Opp	Gear	Pump	Springs
Creston, Taxi		1,800	121	Pneu	36x4	36x4	Under hood	4	4.125x5.500	27.25	L-head	Block	Left	Gear	Thermo	Springs
Danielson, A	3,000	2,000	115	Solid	36x3	36x4	Under seat	4	4.250x4.250	28.90	T-head	Sep	Opp	Gear	Pump	Springs
Dart, B	2,000	1,300	114	Solid	36x3	36x3	Under hood	4	4.063x4.500	27.10	L-head	Block	S & H	Gear	Pump	Trunnions
Dart, C	4,000	1,775	130	Solid	34x4	36x4	Under hood	4	4.125x5.500	27.25	L-head	Block	S & H	Gear	Pump	Trunnions
DeKalb, D-2	4,000	2,800	136-44	Solid	36x4	36x3*	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Diamond, T. J	3,000	2,250	127-44	Solid	36x3	36x5	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Diamond, T. G	6,000	3,350	144	Solid	36x5	36x5*	Under hood	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Springs
Diamond, T. G	10,000	3,600	144	Solid	36x6	36x6*	Under hood	4	5.000x5.500	40.00	L-head	Pairs	Left	Gear	Pump	Springs
Dispatch, 1914	1,200	825	120	Pneu	36x3	36x3	Under hood	4	3.750x5.000	22.50	L-head	Block	Right	Gear	Thermo	Rigid
Dorris, Del	1,500	2,100	132-44	Pneu	35x4	35x4	Under hood	4	4.375x5.000	30.63	L-head	Pairs	Head	Gear	Pump	Rigid
Dorris, 2-ton	4,000	2,500	148	Solid	34x3	36x3*	Under hood	4	4.375x5.000	30.63	L-head	Pairs	Head	Gear	Pump	Rigid
Fargo, E	1,500	800	86-100	Solid	35x3	35x3	Under body	2	4.500x6.000	16.20	L-head	Sep	Head	Gear	Thermo	Rigid
Federal, G. H		1,800					Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Springs
Four Wheel Drive, G**	3,000	3,800	124	Solid	36x4	36x4	Under seat	4	4.250x5.000	28.90	T-head	Pairs	Opp	Gear	Pump	Trunnions
Four Wheel Drive, B**	6,000	4,000	124	Solid	36x6	36x6	Under seat	4	4.750x5.500	36.10	T-head	Pairs	Opp	Gear	Pump	Trunnions
Gabriel, K		1,000	106	Solid	32x4	32x4	Under hood	4	3.500x5.000	19.60	L-head	Block	Left	Gear	Thermo	Rigid
Gabriel, H		1,500	126	Solid	34x4	34x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Rigid
Gabriel, L		2,500	154	Solid	36x5	36x5*	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Rigid
Garford, L	4,000	2,800	128	Solid	36x5	40x3*	Under floor	4	4.250x5.250	28.90	L-head	Block	Left	Gear	Pump	Springs
Garford, J	6,000	3,500	128	Solid	36x5	40x4*	Under floor	4	4.250x5.250	28.90	L-head	Block	Left	Gear	Pump	Springs
Garford, K	8,000	3,850	128	Solid	36x5	40x5*	Under floor	4	4.250x5.250	28.90	L-head	Block	Left	Gear	Pump	Springs
Garford, D	10,000	4,500	128	Solid	36x6	40x6*	Under floor	4	4.250x5.250	28.90	L-head	Block	Left	Gear	Pump	Springs
Garford, F	12,000	4,850	128	Solid	36x6	40x7*	Under floor	4	4.250x5.250	28.90	L-head	Block	Left	Gear	Pump	Springs
Gay, F	2,000	1,475	114	Solid	36x3	36x4	Under hood	4	3.750x4.500	22.50	L-head	Pairs	Left	Hel'l	Pump	Springs
Gay, G	3,000	1,675	120	Solid	36x3	36x4	Under hood	4	4.000x4.500	25.60	L-head	Pairs	Left	Hel'l	Pump	Springs
Geneva, 2	12,000	1,250	96	Solid	34x2	36x2	Under hood	2	5.125x4.500	21.00	L-head	Sep	S & H	Gear	Thermo	Trunnions
G. M. C., VC	2,500	1,900	148	Solid	34x3	36x5	Under hood	4	3.500x5.250	19.60	L-head	Block	Left	Gear	Pump	Rigid
G. M. C., SC	4,000	2,600	143	Solid	34x4	36x3*	Under hood	4	4.000x6.000	25.60	L-head	Block	Left	Gear	Pump	Rigid
G. M. C., H	7,000	3,200	138	Solid	36x5	36x5	Under seat	4	5.000x5.000	40.00	L-head	Pairs	Left	Gear	Pump	Ball joint
G. M. C., HU	7,000	3,500	156	Solid	36x5	42x5*	Under hood	4	5.000x5.000	40.00	L-head	Pairs	Left	Gear	Pump	Rigid
G. M. C., KU	10,000	4,500	156	Solid	36x6	42x6*	Under hood	4	5.000x5.000	40.00	L-head	Pairs	Left	Gear	Pump	Rigid
G. M. C., KUL	10,000	4,600	208	Solid	36x6	42x6*	Under hood	4	5.000x5.000	40.00	L-head	Pairs	Left	Gear	Pump	Rigid
G. M. C., K	10,000	4,250	138	Solid	36x6	36x5*	Under seat	4	5.000x5.000	40.00	L-head	Pairs	Left	Gear	Pump	Rigid
B. A. Gramm, 1-ton	2,000	1,750	130	Solid	34x3	36x4	Under hood	4	4.750x5.250	22.50	L-head	Block	Right	Gear	Pump	Springs
B. A. Gramm, 2-ton	4,000	2,750	128	Solid	36x4	36x3*	Bet seats	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Springs
B. A. Gramm, 3-ton	7,000	3,600	140	Solid	36x5	36x5*	Bet seats	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Springs
B. A. Gramm, 5-ton	10,000	4,500	168	Solid	36x6	36x6*	Under hood	6	4.125x5.250	40.00	L-head	Threes	Left	Gear	Pump	Springs
Great Eagle, A			145	Pneu	37x5	37x5	Under hood	4	4.750x5.000	36.10	T-head	Pairs	Opp	Gear	Pump	Rigid
Great Eagle, D			145	Pneu	37x5	37x5	Under hood	6	4.500x6.250	48.60	T-head	Pairs	Opp	Gear	Pump	Rigid
Harvey, D	3,000	1,875	130	Solid	34x3	38x4	Under hood	4	3.750x5.500	22.50	L-head	Block	Right	Gear	Pump	Trunnions

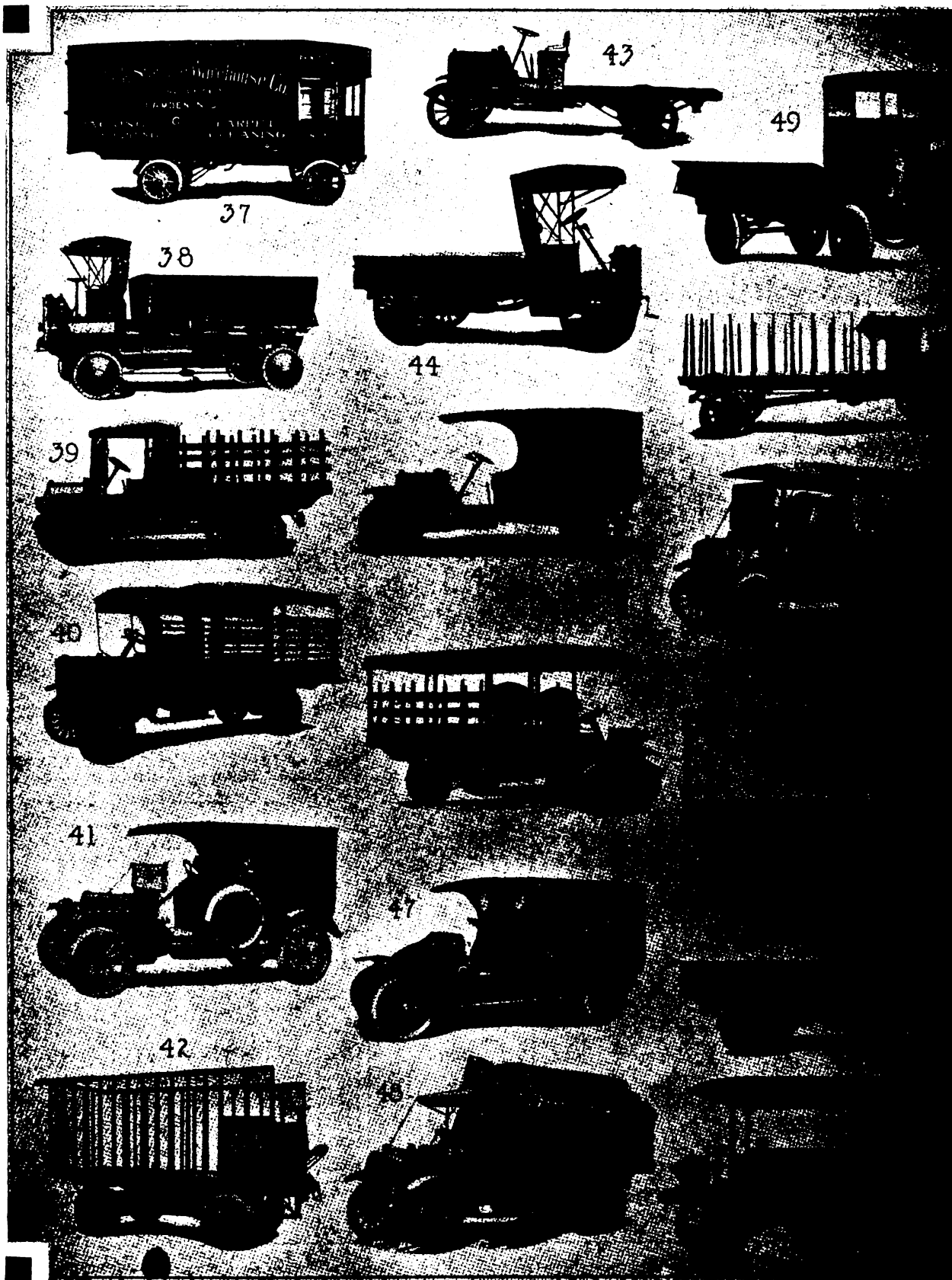
** Drives on four wheels. † Gas-electric power plant.
 ABBREVIATIONS:—Tires: Pneu, pneumatic; * dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pm, splash and pressure. Clutch: Exp bd, expansive band; Con bd, contracting band.

line Commercial Vehicle Chassis in Tabulated Form

IGNITION			Carburetor	Motor Lubrication	TRANSMISSION						RUNNING GEAR				BEARING S		NAME AND MODEL
System	Magneto	Control			GEARSET				Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset	Rear Axle	
					Clutch Type	Type	Location	No. Forw'd Speeds			Front	Rear	Steering	Location Gear-Shift			
Sing. Sing. Sing.	Eisemann Eisemann Eisemann	Hand Hand Hand	Rayfield Rayfield Rayfield	Splash Splash Splash	Cone Cone Cone	Sel. Sel. Sel.	Unit J Unit J Unit J	3 3 3	7 42-1 6 50-1 6 50-1	Chain Chain Chain	1/2 Ell. 1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Plat. 1/2 Plat.	Left. Left. Left.	Center Center Center	Ball Ball Ball	Ball Roll Roll	Bessen, er, C Bessemer, B Bessemer, A
Doub. Doub.	Remy Remy	Gov. Hand	Marvel Marvel	Spl-Pres Splash	Cone Cone	Sel. Sel.	Amid. Amid.	3 3		Chain Bevel	1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Left. Left.	Left. Center	Roll Roll	Roll Ball	Best, A Best, C
Sing. Dual. Dual.	Bosch Bosch Bosch	Fixed Fixed Fixed		Splash Splash Splash	Cone Cone Cone	Sel. Sel. Sel.	Amid. Amid. Amid.	3 3 3		T Worm T Worm T Worm	1/2 Ell. 1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell. 1/2 Ell.	Right. Right. Right.	Right. Right. Right.	Ball Ball Ball	B & R B & R B & R	Blair, C Blair, D Blair, E
Dual.	Mea.	Hand	Excelsior	Splash	Disk	Sel.	Unit M.	3		Int G.	1/2 Ell.	1/2 Ell.	Left.	Center	Ball	Ball	Brown
Dual. Dual. Dual.	Briggs Briggs Briggs	Hand Hand Hand	Excelsior Schebler Rayfield	Spl-Pres Splash Spl-pres		Fric Fric Fric			3 60-1 3 00-1 3 00-1	Chain Chain Chain	1/2 Ell. 1/2 Ell. 1/2 Ell.	Ell. Ell. Ell.	Right Right Right	Right Right Right	Ball Ball Roll	Ball Ball Roll	Buckeye, V-1 Buckeye, V-2 Buckeye, V-4
Dual. Dual.	Remy Remy	Hand Hand	Marvel Marvel	Splash Splash	Cone Cone	Sel. Sel.	Amid Amid	3 3		Bevel Bevel	1/2 Ell. 1/2 Ell.	Ell. Ell.	Left. Left.	Center Center	Ball Ball	B & R B & R	Buick, 3 Buick, 4
Sing.	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid	3	5 06-1	Bevel	1/2 Ell.	1/2 Ell.	Left.	Center	Ball	Roll	Butler, 1914
Sing. Sing. Sing. Sing. Sing.	Bosch Bosch Bosch Bosch Bosch		Holley Holley Holley Holley Holley	In fuel In fuel In fuel In fuel In fuel		Plan Sel. Plan Sel. Sel.	Amid Amid Plan Unit M Unit M	2 2 2 3 3	3 00-1 7 80-1 3 00-1 8 60-1 8 60-1	Chain Chain Chain Chain Chain	Ell. Ell. Ell. Ell. Ell.	Ell. Plat. Plat. Plat. Plat.	Right Right Right Right Right	Right Right Right Right Right	Ball Ball Ball Roll Roll	Ball Ball Ball Roll Roll	Chase, D Chase, K Chase, H Chase, L Chase, J
Dual. Dual.	Remy Remy	Hand Hand	Schebler Schebler	Spl-Pres Splash	Cone Cone	Sel. Sel.	Unit J Unit J	3 3		Chain Chain	Ell. Ell.	Ell. Plat.	Right Right	Right Right	Roll Roll	Roll Roll	Coleman, B Coleman, C
Sing.	Bosch	Fixed	Holley	Splash		Fric				Chain	1/2 Ell.	1/2 Ell.	Left.	Left.		Roll	Commerce, Del
Dual.	Bosch				Cone	Sel.		3	8 25-1	Chain	1/2 Ell.	Plat.					Continental
Sing.	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid	3	8 00-1	Chain	1/2 Ell.	1/2 Ell.	Left.	Center	Roll	Ball	Corbitt, F
Dual. Dual.	Mea. Mea.	Hand Hand	Stromberg Stromberg	Spl-Pres Spl-Pres						Int G. Int G.	1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Right Right		Roll Roll		Couple-Gear, A C T** Couple-Gear, A C T**
Sing. Sing.	Bosch Bosch	Fixed Fixed	Stromberg Stromberg	Pressure Pressure	Cone Cone	Sel. Sel.	Amid Amid.	4 4		T Worm T Worm	1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Left Left.	Center Center	Ball Ball	Ball Ball	Crown, B Crown, C
Sing.	Eisemann	Auto	Planhard	Splash	Disk	Sel.	Amid	3		Bevel	1/2 Ell.	1/2 Ell.	Left.	Center	Plain	Ball	Croxtan, Taxi
Doub.	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J	3		Chain	1/2 Ell.	1/2 Ell.	Right	Right	Ball	Ball	Danielson, A
Sing. Sing.	Eisemann Eisemann	Fixed	Stromberg Stromberg	Splash Splash	Cone Cone	Sel. Sel.	Amid Amid.	3 3		Chain Chain	1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Left Left.	Center Center			Dart, B Dart, C
Sing.	Bosch	Fixed	Stromberg	Splash	Cone	Sel.	Amid	3	7 13-1	Chain	1/2 Ell.	1/2 Ell.	Left.	Center	Roll	Roll	DeKalb, D-2
Sing. Dual. Dual.	Bosch Bosch Bosch	Fixed Hand Hand	Rayfield Rayfield Rayfield	Spl-Pres Spl-Pres Spl-Pres	Disk Disk Disk	Sel. Sel. Sel.	Unit M. Amid Amid.	3 3 3		T Worm Chain Chain	1/2 Ell. 1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell. 1/2 Ell.	Right Right Right	Center Right Right	Roll Roll Roll	Roll Roll Roll	Diamond, T J Diamond, T G Diamond, T G
Dual.	Spitdorf	Hand	Zenith	Pressure	Disk	Fric	Amid.		4 00-1	Chain	Ell.	Ell.	Right	Center	Ball	Ball	Dispatch, 1914
Sing. Dup.	Bosch Bosch	Hand Hand	Flechter Flechter	Splash Splash	Disk Disk	Sel. Sel.	Unit M. Unit M.	3 3	4 93-1 7 65-1	Bevel Chain	1/2 Ell. 1/2 Ell.	1/2 Plat. 1/2 Ell.	Left Right	Center Right	Roll Roll	Roll Roll	Dorris, Del Dorris, 2-ton
Dual.	Lutz	Hand	Holley	Splash		Fric	Amid.		4 00-1	Bevel	1/2 Ell.	Plat.	Left.	Left.		Roll	Fargo, E
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Unit J	3	7 09-1	Chain	1/2 Ell.	1/2 Ell.	Left.	Center	Roll	Roll	Federal, G H
Sing. Sing.	Bosch Bosch	Hand Hand	Stromberg Stromberg	Spl-Pres Spl-Pres	Disk Disk	Ind C Ind C	Amid Amid.	3 3	9 79-1 8 90-1		1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Right Right	Right Right	Ball Ball	Ball Ball	Four Wheel Drive, G** Four Wheel Drive, B**
Sing. Sing. Sing.	Bosch Bosch Bosch	Hand Hand Hand	Stromberg Stromberg Stromberg	Splash Splash Splash	Cone Cone Cone	Sel. Sel. Sel.	Amid Amid Amid.	3 3 4	4 00-1 4 25-1 5 50-1	Bevel Bevel Bevel	1/2 Ell. 1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell. 1/2 Ell.	Left Left Left.	Center Center Center	Roll Roll Roll	Ball Roll Roll	Gabriel, K Gabriel, H Gabriel, L
Dual. Dual. Dual. Dual.	Bosch Bosch Bosch Bosch	Hand Hand Hand Hand	Own Own Own Own	Spl-Pres Spl-Pres Spl-Pres Spl-Pres	Cone Cone Cone Cone	Sel. Sel. Sel. Sel.	Amid Amid Amid Amid.	3 3 4 4	9 17-1 10 74-1 10 74-1 13 31-1	Chain Chain Chain Chain	1/2 Ell. 1/2 Ell. Ell. Ell.	1/2 Ell. 1/2 Ell. 1/2 Ell. 1/2 Ell.	Right Right Right Right	Right Right Right Right	Roll Roll Roll Ball	Roll Roll Roll Roll	Garford, L Garford, J Garford, K Garford, D
Sing. Sing.	Eisemann Eisemann	Fixed Fixed	Stromberg Stromberg	Splash Splash	Cone Cone	Sel. Sel.	Amid Amid.	3 3	6 00-1 7 00-1	Chain Chain	1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell.	Left Left.	Center Center	Ball Ball	Roll Roll	Gay, F Gay, G
Sing.	Bosch	Fixed	Schebler	Spl-Pres	Disk	Plan	Unit J	2	8 00-1	Chain	1/2 Ell.	Ell.	Right		Ball	Ball	Geneva, 2
Sing. Sing. Doub. Doub. Doub. Doub. Doub.	Bosch Bosch Mea. Mea. Mea. Mea. Mea.	Hand Hand Hand Hand Hand Hand Hand	Kingston Kingston Holley Holley Holley Holley Holley	Splash Splash Splash Splash Splash Splash Splash	Cone Cone Disk Disk Disk Disk Disk	Sel. Sel. Prog Prog Prog Prog Prog	Amid Amid Amid Amid Amid Amid Amid.	3 3 3 3 3 3 3	8 65-1 8 00-1 7 76-1 9 00-1 12 00-1 12 00-1 10 25-1	Chain Chain Chain Chain Chain Chain Chain	1/2 Ell. 1/2 Ell. Ell. Ell. Ell. Ell. Ell.	1/2 Ell. 1/2 Ell. Ell. Ell. Ell. Ell. Ell.	Left Left Right Left Left Left Left	Center Center Right Center Center Center Right	Ball Ball Ball Ball Ball Ball Ball	Roll Roll Roll Roll Roll Roll Roll	G. M. C., VC G. M. C., SC G. M. C., H G. M. C., HU G. M. C., KUL G. M. C., K
Sing. Dup. Dup.	Bosch Bosch Bosch	Hand Hand Hand	Schebler Schebler Schebler	Splash Splash Splash	Cone Disk Disk	Sel. Ind C Ind C	Amid Amid Amid.	3 3 4	7 00-1 8 30-1 9 40-1	Chain Chain Chain	1/2 Ell. 1/2 Ell. 1/2 Ell.	1/2 Ell. 1/2 Ell. 1/2 Ell.	Left Right Right	Center Right Right	Ball Ball Ball	Ball Roll Roll	B. A. Gramm, 1-ton B. A. Gramm, 2-ton B. A. Gramm, 3 1/2-ton
Doub. Doub.	Eisemann Eisemann	Hand Hand	Rayfield Rayfield		Cone Cone	Sel. Sel.	Amid Amid.	3 3		Bevel Bevel	1/2 Ell. 1/2 Ell.	Plat. Plat.	Left Left.	Left Left.	Roll Roll	Ball Ball	Great Eagle, A Great Eagle, D
Sing.	Eisemann	Auto	Holley	Splash	Cone	Sel.	Unit J	3	8 20-1	Chain	1/2 Ell.	1/2 Ell.	Left.	Center	Ball	Ball	Harvey, D

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor. Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels; Springs: 1/2 Ell, semi-elliptic; Ell, elliptic; 1/2 Ell, 1/2 elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.

Typical Models of American Motor Wagon



Trucks That Are Standards for 1914 Production.



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Specifications of Three Hundred and Twelve Gaso

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Horner, 1-ton	2,000	2,000	145	Solid	34x3	34x4	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 2-ton	4,000	2,650	145	Solid	36x4	36x3	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 3-ton	6,000	3,200	145	Solid	36x4	36x4	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Bumper
Horner, 5-ton	10,000	4,200	156	Solid	36x5	40x4	Under hood	4	4 500x3 500	32 40	L-head	Pairs	Left	Gear	Pump	Bumper
Horner, 5-ton	10,000	4,200	156	Solid	38x6	42x6	Under hood	4	5 250x5 750	44 10	T-head	Pairs	Opp	Gear	Pump	Bumper
Hupmobile, 32	800		106	Pneu	32x4	33x4	Under hood	4	3 250x5 500	16 90	L-head	Block	Left	Chain	Thermo	Rigid
Ideal, I	2,000	1,500	115	Solid	36x3	36x3	Under seat	4	3 750x4 500	22 50	L-head	Block	Left	Gear	Thermo	Spring
Ideal, H-2	3,000	2,000	124	Solid	36x3	36x4	Under seat	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Spring
Ideal, K	5,000	2,500	134	Solid	36x4	36x3	Under seat	4	4 500x5 500	32 40	L-head	Pairs	Left	Gear	Pump	Spring
International, MW	1,000		90	Solid	-x2	-x2	Under body	2	4 500x5 000	16 20	I-head	Sep	Head	Gear	Pump	Spring
International, MA	1,000		90	Solid	-x2	-x2	Under body	2	5 000x5 000	20 00	I-head	Sep	Head	Gear	Air	
Jeffery, 1514	1,500		120	Pneu	34x4	34x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Hel'l	Pump	Spring
Jeffery, 2014	2,000		130	Solid	34x3	34x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Hel'l	Pump	Spring
Kalamazoo, B	3,000	1,590	110	Solid	36x3	36x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Gear	Pump	Spring
Kearns, A	1,500	850	100	Solid	36x2	36x2	Under hood	4	3 500x4 000	19 60	L-head	Pairs	Right	Chain	Pump	Trunn's
Kelly, K-30	2,000	2,000	120-44	Solid	36x3	36x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Right	Gear	Pump	Spring
Kelly, K-40	6,000		150-72	Solid	38x5	42x5	Under hood	4	4 500x6 500	32 40	T-head	Pairs	Opp	Gear	Pump	Spring
King, 3	7,000	3,350	120	Solid	36x6	36x4	Under floor	4	4 500x5 500	32 40	L-head	Pairs	Left	Hel'l	Pump	Spring
Kieselkar, 1-ton	1,500	1,500	125	Pneu	34x4	34x4	Under hood	4	4 250x5 250	28 90	L-head	Pairs	Left	Chain	Pump	Spring
Kieselkar, 1-ton	2,000	1,850	140	Pneu	37x5	37x5	Under hood	4	4 500x5 250	32 40	L-head	Pairs	Left	Chain	Pump	Spring
Kieselkar, 1-ton	3,000	2,100	132	Solid	34x3	38x5	Under hood	4	4 250x5 250	28 90	L-head	Pairs	Left	Chain	Pump	Spring
Kieselkar, 2-ton	5,030	2,750	144	Solid	36x4	38x4	Under hood	4	4 500x5 250	32 40	L-head	Pairs	Left	Chain	Pump	Spring
Kieselkar, 3-ton	7,030	3,350	162	Solid	36x5	40x5	Under hood	4	4 875x5 000	38 00	L-head	Pairs	Left	Chain	Pump	Spring
Kieselkar, 6-ton	12,030	4,350	168	Solid	36x6	40x6	Under hood	4	4 875x5 000	38 00	L-head	Pairs	Left	Chain	Pump	Spring
Kniekerbocker, 3-ton	6,000	3,750	120	Solid			Under seat	4	4 500x5 500	32 40	T-head	Pairs	Opp	Gear	Pump	Spring
Kniekerbocker, 4-ton	8,000	4,000	120	Solid			Under seat	4	4 500x5 500	32 40	T-head	Pairs	Opp	Gear	Pump	Spring
Kniekerbocker, 5-ton	10,000	4,500	134	Solid			Under seat	4	4 500x5 500	32 40	T-head	Pairs	Opp	Gear	Pump	Spring
Knox, R-3	4,000	3,000	145	Solid	34x4	34x4	Under hood	4	5 000x5 500	40 00	I-head	Sep	Head	Gear	Pump	Spring
Knox, Tractor	20,000	3,250	139	Solid	34x5	36x5	Under hood	4	5 000x5 500	40 00	I-head	Sep	Head	Gear	Pump	Spring
Knox, Tractor	40,000	3,750	140	Solid	34x5	38x6	Under hood	4	5 000x5 500	40 00	I-head	Sep	Head	Gear	Pump	Spring
Knox, Combination		4,100	145	Solid	40x5	40x5	Under hood	4	5 500x5 500	48 04	I-head	Sep	Head	Gear	Pump	Spring
Koshier, 1-ton	2,000	725	90	Solid	36x2	36x2	Under body	2	5 250x4 000	22 00	L-head	Sep	Side	Gear	Thermo	Spring
Kremer, 1914	1,000	850	110	Pneu	32x3	32x3	Under hood	4	3 500x4 000	19 60	L-head	Pairs	Left	Gear	Pump	Spring
Krebs, E	1,000	950	100	Pneu	32x3	32x3	Under hood	4	3 500x4 000	19 60	L-head	Pairs	Left	Gear	Pump	Cushion
Krebs, BB	1,500	1,425	100	Pneu	34x4	34x4	Under hood	4	3 750x4 500	22 50	L-head	Block	Right	Gear	Thermo	Cushion
Krebs, AA	2,000	1,425	100	Solid	34x3	34x3	Under hood	4	3 750x4 500	22 50	L-head	Block	Right	Gear	Thermo	Cushion
Krebs, D & DD	3,000	1,775	118-44	Solid	36x3	36x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Right	Gear	Thermo	Cushion
LaFrance, 6-ton	12,000	5,500	144	Solid	36x5	38x6	Between seats	4	5 500x6 000	48 40	T-head	Pairs	Opp	Gear	Pump	Spring
Landshaft, C	1,500	1,000	117	Solid	34x2	36x2	Under hood	4	3 000x4 500	14 40	L-head	Block	Right	Gear	Thermo	Spring
Landshaft, J	3,000	1,800	134	Solid	34x3	36x4	Under hood	4	4 125x5 250	27 25	L-head	Block	Right	Gear	Pump	Spring
Lange, C	2,000	2,250	125	Solid	36x3	38x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Hel'l	Thermo	Spring
Lange, B	4,000	3,000	136	Solid	36x4	38x5	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Hel'l	Thermo	Spring
Laurh-Juergens, K	2,000	2,100	Opt	Opt	Opt	Opt		4	3 800x5 300	23 25	L-head	Block	Left	Gear	Pump	Spring
Laurh-Juergens, L	4,000	2,800	Opt	Opt	Opt	Opt		4	3 800x5 300	23 25	L-head	Block	Left	Gear	Pump	Spring
Laurh-Juergens, M	6,000	3,450	Opt	Opt	Opt	Opt		4	4 800x5 000	37 00	L-head	Sep	Left	Gear	Pump	Spring
Lewis, 21	5,000	3,250	144	Solid	34x4	36x3	Optional	4	4 250x5 000	28 90	T-head	Pairs	Opp	Gear	Pump	S & T
Lewis, 21S	6,000	3,500	144	Solid	34x4	36x4	Optional	4	4 250x5 000	28 90	T-head	Pairs	Opp	Gear	Pump	S & T
Lewis, 51	10,000	4,750	144	Solid	36x6	38x6	Under seat	4	4 750x5 500	36 10	T-head	Pairs	Opp	Gear	Pump	S & T
Light, 800 lbs	800		66	Pneu	26x3	26x3		2	3 500x3 670	9 80		Sep		Gear	Air	
Lippard-Stewart, C	1,500	1,650	125	Pneu	35x4	35x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Gear	Pump	Spring
Lippard-Stewart, F	3,000	2,300	145-58	Solid	36x3	36x3	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Spring
Little-Giant, F	2,000	1,200	110	Solid	-x2	-x3	Under seat	2	5 000x4 000	20 00	L-head	Sep	S & H	Gear	Thermo	Rigid
Little-Giant, H	2,000	1,350	110	Solid	-x3	-x3	Under floor	4	3 750x5 500	22 50	L-head	Block	Right	Gear	Thermo	Spring
Locomobile, A	10,000	4,800	140-70	Solid	40x6	40x6	Under seat	4	5 000x6 000	40 00	T-head	Pairs	Opp	Gear	Pump	Spring
Longest, 3-A	8,000	4,000	144-72	Solid	36x5	36x5	Under hood	4	5 000x5 500	40 00	T-head	Pairs	Opp	Gear	Pump	Spring
Lord Baltimore, B	2,000	1,800	128	Solid	34x3	36x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Gear	Pump	Trunn's
Lord Baltimore, D	4,000	2,300	142	Solid	34x4	36x3	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Trunn's
Maccarr, A	1,500	1,650	120-32	Pneu	36x4	36x4	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Gear	Pump	Spring
Maccarr, B	2,000	1,900	Opt	Solid	36x4	36x5	Under hood	4	3 750x5 250	22 50	L-head	Block	Left	Gear	Pump	Spring
Maccarr, C	3,000	2,150	Opt	Solid	36x4	36x6	Under hood	4	4 125x5 250	27 25	L-head	Block	Left	Gear	Pump	Spring
Meak, 1-ton	2,000	2,000	Opt	Opt	Opt	Opt	Under hood	4	4 800x5 500	32 40	L-head	Pairs	Left	Chain	Pump	Rigid
Meak, 5-ton	10,000	4,000	Opt	Opt	Opt	Opt	Under hood	4	5 500x6 000	48 40	L-head	Pairs	Left	Chain	Pump	Rigid
Mais, C	3,000	2,750	119	Solid	36x4	36x5	Under hood	4	4 000x5 250	25 80	T-head	Pairs	Opp	Gear	Pump	Spring
Mais, D	3,000	2,800	132	Solid	36x4	36x5	Under hood	4	4 000x5 250	25 80	T-head	Pairs	Opp	Gear	Pump	Spring
Mais, E	4,000	2,850	132	Solid	36x4	36x6	Under hood	4	4 000x5 250	25 80	T-head	Pairs	Opp	Gear	Pump	Spring
Mais, F	4,000	3,000	145	Solid	36x4	36x4	Under hood	4	4 000x5 250	25 80	T-head	Pairs	Opp	Gear	Pump	Spring
Mais, G	5,000	3,200	145	Solid	36x4	36x4	Under hood	4	4 815x5 250	29 78	T-head	Pairs	Opp	Gear	Pump	Spring
Mais, H	6,000	3,400	160	Solid	36x5	36x5	Under hood	4	4 815x5 250	29 78	T-head	Pairs	Opp	Gear	Pump	Spring
Marmen, Delivery	1,400	2,500	120		32x4	32x4	Under hood	4	4 000x5 000	25 60	T-head	Pairs	Opp	Hel'l	Pump	Trunn's
Martin, B	3,000		140	Solid	36x3	40x4	Under hood	4	4 250x5 000	28 90	T-head	Pairs	Opp	Hel'l	Pump	Spring
Martin, S	3,000		121	Solid	36x3	40x4	Under seat	4	4 000x5 000	25 60	L-head	Block	Side	Hel'l	Pump	Spring

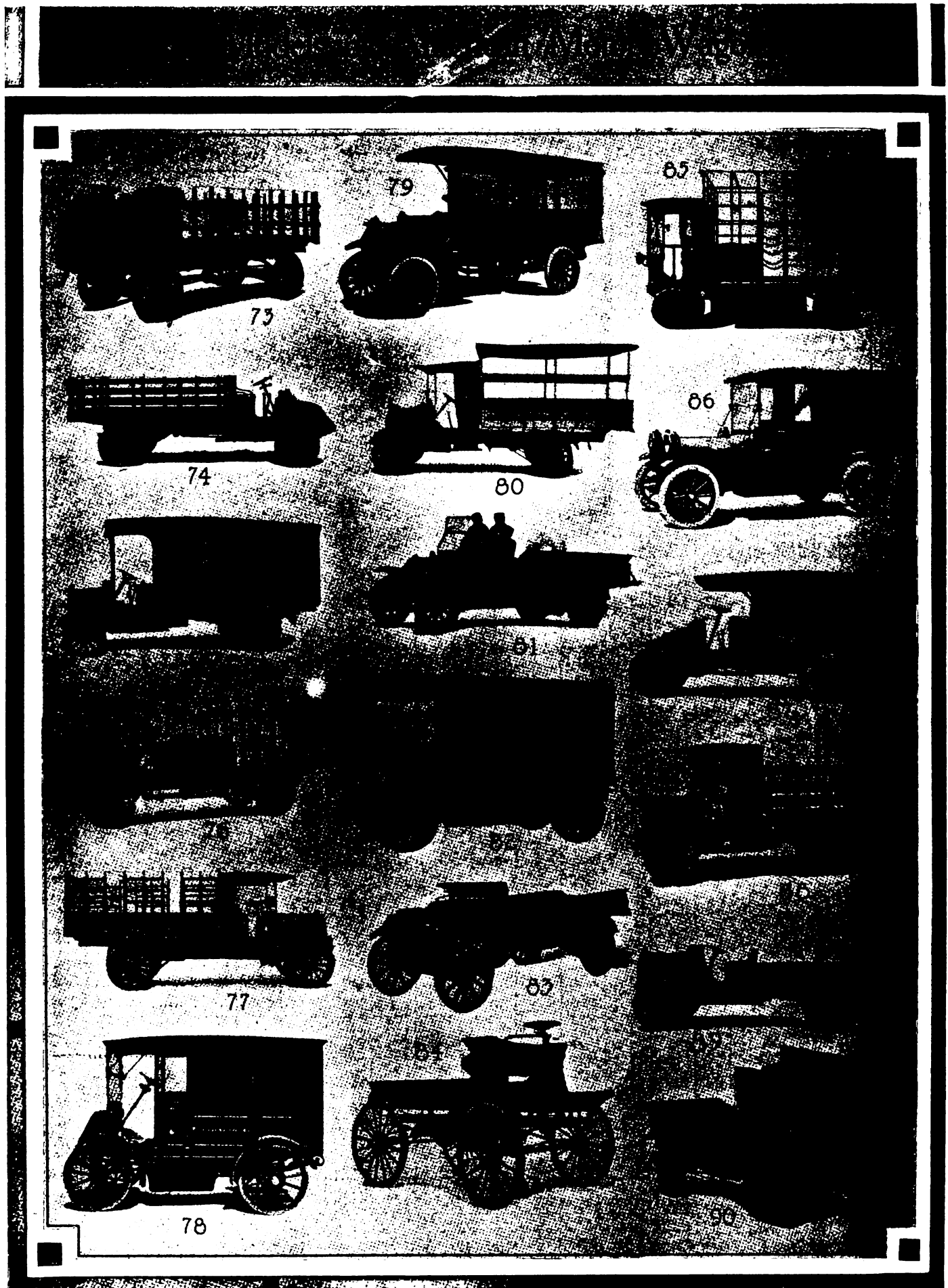
**Drives on four wheels.

ABBREVIATIONS:—Tires: Pneu, pneumatic; * dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-prs, splash and pressure. Chain: Exp bd, expanding band; Con bd, contracting band.

line Commercial Vehicle Chassis in Tabulated Form

IGNITION			Carburetor	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset		Rear Axle
						Type	Location	No. Forw'd Speeds			Front	Rear	Steering	Location Gear-Shift			
Dist.	Mag.	Gov.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	6.80-1	Chain	Ell.	Plat.	Left.	Center.	Roll.	Roll.	Horner, 1-ton
Dist.	Mag.	Gov.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	9.43-1	Chain	Ell.	Plat.	Left.	Center.	Roll.	Roll.	Horner, 2-ton
Dist.	Mag.	Gov.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	7.79-1	Chain	Ell.	Plat.	Left.	Center.	Roll.	Roll.	Horner, 1 1/2-ton
Dist.	Mag.	Gov.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	9.40-1	Chain	Ell.	Plat.	Left.	Center.	Roll.	Roll.	Horner, 3-ton
Dist.	Mag.	Gov.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	13.42-1	Chain	Ell.	Plat.	Left.	Center.	Roll.	Roll.	Horner, 5-ton
Mag.	Bech.	Hand.	Zenith	Spl-Pres.	Diak.	Sel.	Unit M.	3	3.86-1	Bevel	Ell.	Cross	Right.	Center.	B & R.	Roll.	Hupmobile, 22
Mag.	Eschmann	Hand.	Schebler	Spl-Pres.	Cone	Sel.	Amid.	3	6.70-1	Chain	Ell.	Ell.	Right.	Right.	Ball.	Ball.	Ideal, I
Dist.	Eschmann	Hand.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	6.70-1	Chain	Ell.	Plat.	Right.	Right.	Roll.	Roll.	Ideal, H-2
Dist.	Eschmann	Hand.	Stromberg	Spl-Pres.	Diak.	Sel.	Unit M.	3	7.40-1	Chain	Ell.	Plat.	Right.	Right.	Roll.	Roll.	Ideal, K
Dist.	Heime	Hand.	Schebler	Spl-Pres.	Con Bd			2		Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	International, MW
Dist.	Heime	Hand.	Schebler	Spl-Pres.	Con Bd			2		Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	International, 15A
Dist.	Bech.	Hand.	Rayfield	Spl-Pres.	Diak.	Sel.	Amid.	3	4.00-1	Bevel	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Jeffery, 1514
Dist.	Bech.	Hand.	Rayfield	Spl-Pres.	Diak.	Sel.	Amid.	3	6.68-1	Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Jeffery, 2014
Mag.	Bech.	Fixed.	Kingston	Splash.	Cone	Sel.	Unit J.	3		Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Kalamazoo, B
Dist.	Bech.	Hand.	Schebler	Splash.		Fric.				Chain	Ell.	Ell.	Right.	Right.	Roll.	Ball.	Kearna, A
Mag.	Eschmann	Auto.	Breeze	Spl-Pres.	Cone	Sel.	Amid.	3	8.60-1	Chain	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Kelly, K-30
Mag.	Eschmann	Auto.	Schebler	Spl-Pres.	Cone	Sel.	Amid.	3	11.60-1	Chain	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Kelly, K-40
Dist.	Bech.	Fixed.	Schebler	Spl-Pres.	Diak.	Ind C.	Unit J.	3	10.72-1	Chain	Ell.	Ell.	Right.	Right.	Ball.	Roll.	King, 3
Dist.	Bech.	Hand.	Stromberg	Splash.	Cone	Sel.	Amid.	3	5.00-1	Bevel	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Kisselkar, 1-ton
Dist.	Bech.	Hand.	Stromberg	Splash.	Cone	Sel.	Amid.	3	5.00-1	Bevel	Ell.	Ell.	Right.	Right.	B & R.	Roll.	Kisselkar, 1-ton
Dist.	Bech.	Hand.	Stromberg	Splash.	Cone	Sel.	Amid.	4	8.07-1	Chain	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Kisselkar, 1 1/2-ton
Dist.	Bech.	Hand.	Stromberg	Splash.	Cone	Sel.	Amid.	4	9.95-1	Chain	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Kisselkar, 2-ton
Dist.	Bech.	Hand.	Stromberg	Splash.	Cone	Sel.	Amid.	4	11.00-1	Chain	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Kisselkar, 3-ton
Mag.	Bech.	Hand.	Stromberg	Spl-Pres.	Cone	Sel.	Amid.	4	12.70-1	Chain	Ell.	Ell.	Left.	Center.	Ball.	Roll.	Kisselkar, 5-ton
Dist.	Bech.	Hand.	Stromberg	Spl-Pres.	Cone	Sel.	Amid.	3		Chain	Ell.	Ell.	Left.	Left.	B & R.	Roll.	Knickerbocker, 3-ton
Dist.	Bech.	Hand.	Stromberg	Spl-Pres.	Cone	Sel.	Amid.	3		Chain	Ell.	Ell.	Left.	Left.	B & R.	Roll.	Knickerbocker, 4-ton
Dist.	Bech.	Hand.	Stromberg	Spl-Pres.	Cone	Sel.	Amid.	3		Chain	Ell.	Ell.	Left.	Left.	B & R.	Roll.	Knickerbocker, 5-ton
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit M.	3	5.34-1	Chain	Ell.	Ell.	Right.	Right.	Ball.	Roll.	Knox, R-3
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit M.	3	10.95-1	Chain	Ell.	Cant.	Right.	Center.	Ball.	Roll.	Knox, Tractor
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Amid.	3	12.11-1	Chain	Ell.	Cant.	Right.	Center.	Ball.	Roll.	Knox, Tractor
Dist.	Bech.	Hand.	Scott	Pressure	Diak.	Sel.	Unit M.	3	5.34-1	Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Knox, Combination
Mag.	Bech.	Fixed.	Schebler	Pressure	Cone	Plan.	Amid.	2	7.00-1	Chain	Ell.	Ell.	Left.	Center.	Plain.	Plain.	Koehler, 1-ton
Mag.	Bech.	Fixed.	Opt.	Splash.	Cone	Sel.	Unit M.	3	4.00-1	Bevel	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Koonath, 1914
Dist.	Bech.	Hand.	Kingston	Splash.	Cone	Sel.	Unit M.	3	4.00-1	Bevel	Ell.	Ell.	Left.	Center.	B & R.	B & R.	Krebs, E
Dist.	Bech.	Auto.	Schebler	Splash.	Cone	Sel.	Amid.	3	4.00-1	Bevel	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Krebs, BB
Dist.	Bech.	Auto.	Schebler	Splash.	Cone	Sel.	Amid.	3	6.40-1	Chain	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Krebs, AA
Dist.	Bech.	Auto.	Schebler	Splash.	Cone	Sel.	Amid.	3	7.80-1	Chain	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Krebs, D & DD
3/4	Bech.	Hand.	Schebler	Spl-Pres.		Hyd.				Chain	Ell.	Ell.	Right.			Roll.	LaFrance, 5-ton
Dist.	Bech.	Hand.	Schebler	Splash.	Diak.	Plan.	Amid.	2	7.00-1	Chain	Ell.	Plat.	Right.	Right.	B & R.	Ball.	Landschaft, C
Dist.	Bech.	Hand.	Rayfield	Splash.	Cone	Sel.	Amid.	3	7.00-1	Chain	Ell.	Plat.	Right.	Right.	Roll.	Roll.	Landschaft, J
Dist.	Connect.	Hand.	Stromberg	Spl-Pres.	Diak.	Ind C.	Amid.	3		Chain	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Lange, C
Dist.	Connect.	Hand.	Stromberg	Spl-Pres.	Diak.	Ind C.	Amid.	3		Chain	Ell.	Ell.	Left.	Center.	B & R.	Roll.	Lange, B
Dist.	Opt.	Hand.	Stromberg	Splash.	Diak.	Sel.	Amid.	4		Chain	Ell.	Ell.	Right.	Right.	Ball.	Ball.	Lauth-Juergens, K
Dist.	Opt.	Hand.	Stromberg	Splash.	Diak.	Sel.	Amid.	4		Chain	Ell.	Ell.	Left.	Right.	Ball.	Ball.	Lauth-Juergens, L
Dist.	Opt.	Hand.	Stromberg	Splash.	Diak.	Sel.	Amid.	4	9.40-1	Chain	Ell.	Ell.	Right.	Right.	Plain.	Ball.	Lauth-Juergens, M
Dist.	Bech.	Hand.	Rayfield	Splash.	Diak.	Sel.	Amid.	3	8.25-1	Chain	Ell.	Plat.	Right.	Right.	B & R.	Roll.	Lewis, 21
Dist.	Bech.	Hand.	Rayfield	Splash.	Diak.	Sel.	Amid.	3	8.25-1	Chain	Ell.	Plat.	Right.	Right.	B & R.	Roll.	Lewis, 218
Dist.	Bech.	Hand.	Rayfield	Splash.	Diak.	Sel.	Amid.	3	9.45-1	Chain	Ell.	Plat.	Right.	Right.	B & R.	Roll.	Lewis, 51
Dist.	Bech.	Hand.	Rayfield	Splash.	Diak.	Sel.	Amid.	3		Roller	Ell.	Ell.		Pedal.			Light, 800 lbs
Mag.	Eschmann	Fixed.	Rayfield	Spl-Pres.	Cone	Sel.	Amid.	3	5.00-1	Bevel	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Lippard-Stewart, C
Mag.	Eschmann	Fixed.	Rayfield	Spl-Pres.	Cone	Sel.	Amid.	3	7.75-1	T Worm	Ell.	Ell.	Left.	Center.	Roll.	Roll.	Lippard-Stewart, F
Dist.	Kingston	Hand.	Holley	Spl-Pres.	Diak.	Sel.	Amid.	3	7.20-1	Chain	Ell.	Ell.	Left.	Center.	Ball.	Ball.	Little-Giant, F
Dist.	Kingston	Hand.	Holley	Spl-Pres.	Diak.	Sel.	Amid.	3	7.20-1	Chain	Ell.	Ell.	Left.	Center.	Ball.	Ball.	Little-Giant, H
Dist.	Bech.	Fixed.	Own	Spl-Pres.	Diak.	Sel.	Amid.	4	10.40-1	Chain	Ell.	Ell.	Right.	Right.	B & R.	Roll.	Loosemobile, A
Dist.	Bech.	Hand.	Schebler	Pressure	Cone	Sel.	Amid.	4		Chain	Ell.	Ell.	Right.	Right.	Plain.	Roll.	Longest, 3-A
Dist.	Eschmann	Fixed.	Schebler	Pressure	Diak.	Sel.	Unit M.	3		Int G.	Ell.	Ell.	Left.	Center.			Lord Baltimore, B
Dist.	Eschmann	Fixed.	Schebler	Pressure	Diak.	Sel.	Unit M.	3		Int G.	Ell.	Ell.	Left.	Center.			Lord Baltimore, D
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit M.	3		Worm	Ell.	Ell.	Left.	Center.		Roll.	Massey, A
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit M.	3		Worm	Ell.	Ell.	Left.	Center.		Roll.	Massey, B
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit M.	3		Worm	Ell.	Ell.	Left.	Center.		Roll.	Massey, C
Dist.	Bech.	Hand.	Hoyt	Pressure	Diak.	Sel.	Amid.	3	5.50-1	Chain	Ell.	Plat.	Left.	Center.	B & R.	Roll.	Musk, 1-ton
Dist.	Bech.	Hand.	Breeze	Spl-Pres.	Cone	Sel.	Amid.	3	9.20-1	Chain	Ell.	Plat.	Right.	Right.	B & R.	Roll.	Musk, 5-ton
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, C
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, D
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, E
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, F
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, G
Dist.	Eschmann	Auto.	Rayfield	Exp Bd	Prog.				Opt.	Int G.	Ell.	Ell.	Left.				Male, H
Dist.	Bech.	Hand.	Stromberg	Pressure	Cone	Sel.	Unit X.	3	5.00-1	Bevel	Ell.	Ell.	Right.	Right.	Ball.	Ball.	Marmen, Delivery
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit J.	3	6.75-1	Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Martin, B
Dist.	Bech.	Hand.	Stromberg	Pressure	Diak.	Sel.	Unit J.	3	7.95-1	Chain	Ell.	Ell.	Right.	Right.	Roll.	Roll.	Martin, S

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch; Hyd, hydraulic. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheel. Springs: Ell, semi-elliptic; Ell, elliptic; Ell, elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.



Trucks That Are Standards for 1914 Production.



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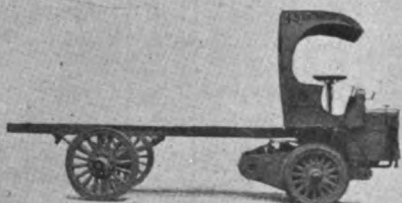
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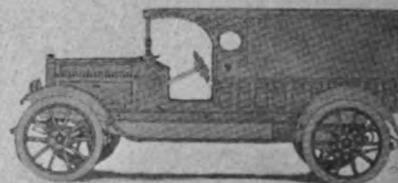
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Specifications of Three Hundred and Twelve Gaso

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Martin, A	4,000		155	Solid	36x4	40x3*	Under hood	4	4.750x5.500	36.10	T-head	Pairs	Opp	Hel'l	Pump	Spring
Martin, E	5,000		132	Solid	36x4	40x3*	Under seat	4	4.250x5.000	28.90	T-head	Pairs	Opp	Hel'l	Pump	Spring
Martin, L	7,000		145	Solid	36x5	40x4*	Under seat	4	4.750x5.500	36.10	T-head	Pairs	Opp	Hel'l	Pump	Spring
Menominee, A-3	1,500	1,125	122	Solid	32x3	32x3	Under hood	4	3.750x4.500	22.50	L-head	Pairs	Left	Gear	Pump	Rigid
Menominee, B-3	2,000	1,400		Solid	34x3	34x3	Under hood	4	4.000x5.000	25.60	L-head	Pairs	Left	Gear	Pump	Spring
Menominee, C	3,000	1,800	130	Solid	36x4	36x5	Under hood	4	4.000x5.000	26.60	L-head	Pairs	Left	Gear	Pump	Spring
M & E, 4-ton	8,000	2,750	114	Solid	34x7*	40x6	Under seat	4	4.125x5.250	27.25	L-head	Pairs	Right	Gear	Pump	Spring
Mercury, P	1,000		85	Solid	38x2	40x2	Under floor	2	4.280x4.080	14.50	L-head	Sep	Side	Gear	Air	
Miller, A	1,000	800	112	Pneu	32x3	32x3	Under hood	4	3.500x4.000	19.60	L-head	Block	Left	Gear	Pump	Rigid
Modern, F	1,500	1,500	136	Solid	36x3	36x3	Under hood	4	3.500x5.000	19.60	L-head	Block	Left	Gear	Pump	Spring
Modern, G	2,000	1,700	136	Solid	36x3	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring
Modern, H	3,000	1,950	136	Solid	36x3	36x5	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Spring
Mogul, L	4,000	2,360	133-44	Solid	36x5	38x3*	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Hel'l	Pump	Spring
Mogul, G	4,000	2,750	120	Solid	36x4	36x5	Under seat	4	4.125x5.250	27.25	L-head	Block	Left	Hel'l	Pump	Spring
Mogul, O	8,000	3,800	142	Solid	36x6	40x5*	Under seat	4	5.000x5.750	40.00	T-head	Pairs	Opp	Hel'l	Pump	Spring
Mogul, M	12,000	4,700	155	Solid	36x7	40x7*	Under seat	4	5.250x5.750	44.10	T-head	Pairs	Opp	Hel'l	Pump	Spring
Mogul, U	12,000	4,750	188	Solid	36x7	40x7*	Under seat	4	5.250x5.750	44.10	T-head	Pairs	Opp	Hel'l	Pump	Spring
Monitor, F	1,000	1,050	110	Solid	34x3	34x3	Under hood	4	3.500x4.000	19.60	T-head	Pairs	Opp		Pump	Spring
Monitor, D	2,000	1,650	100	Solid	34x3	34x3	Under seat	4	3.750x5.000	22.50	T-head	Pairs	Opp		Pump	Spring
Moon, A	1,000	1,350	112	Pneu	33x4	33x4	Under hood	4	3.500x5.000	19.60	L-head	Block	Side	Gear	Pump	Rigid
Moon, B	3,000	1,800	125	Solid	36x3	36x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Side	Gear	Pump	Spring
Moore, 1 1/2-ton	3,000	1,950	130	Solid	36x3	36x4	Under hood	4	4.125x5.250	27.25	L-head	Block	Side		Pump	Spring
Moore, 2-ton	4,000	2,500	160	Solid	36x4	36x4*	Under hood	4	4.125x5.250	27.25	L-head	Block	Side		Pump	Spring
Moore, 3-ton	6,000	3,150	142	Solid	36x5	36x4*	Under hood	4	4.500x5.500	32.40	L-head	Pairs	Side		Pump	Spring
Moore, 4-ton	8,000	3,900	Opt	Solid	36x5	36x5*	Under hood	4	4.750x5.500	36.10	T-head	Pairs	Opp		Pump	Spring
Moore, 5-ton	10,000	4,500	173	Solid	36x6	42x5*	Under hood	4	5.250x7.000	44.10	T-head	Pairs	Opp		Pump	Spring
Mora, 24	2,000	1,400	115	Solid	36x2	36x3	Under hood	4	3.375x5.000	18.25	L-head	Block	Right	Gear	Thermo	Trunn'ns
Moreland, 1500-lb	1,500	1,700					Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring
Moreland, 2-ton	4,000	2,350	120-44				Under seat	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Spring
Moreland, 5-ton	10,000	4,500	156-92				Under seat	4	5.250x7.000	44.10	T-head	Pairs	Opp	Gear	Pump	Spring
Natco, 15	2,000	1,925	104	Solid	36x3	36x3	Under seat	4	3.500x5.000	19.60	L-head	Block	Side	Gear	Thermo	Spring
Nelson-LeMoon, D-1	2,000	1,800	Opt	Solid	37x3	37x4	Under hood	4	3.750x5.250	22.50	L-head	Pairs	Left	Gear	Pump	Rigid
Nelson-LeMoon, D-2	4,000	2,250	Opt	Solid	37x4	37x4*	Under hood	4	4.125x5.250	27.25	L-head	Pairs	Left	Gear	Pump	Rigid
Nelson-LeMoon, D-3	6,000	2,500	Opt	Solid	37x5	37x5*	Under hood	4	4.500x5.500	32.40	L-head	Pairs	Left	Gear	Pump	Rigid
Nevada, H**	6,000	3,500	144	Solid	36x6	36x6	Under seat	4	4.500x6.750	32.40	L-head	Pairs	Left	Gear	Pump	Spring
New York		2,000	129				Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring
O. K., A	1,200	800	112		32x3	32x3	Under hood	4	3.500x4.250	19.60	L-head	Pairs	Left	Gear	Pump	Spring
O. K., 1-ton	2,000	800	125		34x3	34x4	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring
Overland, 79	800		114	Pneu	33x4	33x4	Under hood	4	4.125x4.500	27.25	L-head	Sep	Left	Gear	Thermo	Trunn'ns
Packard, 2-ton	4,000	2,800	120-44	Solid	34x3	34x4	Under hood	4	4.063x5.125	26.40	T-head	Pairs	Opp	Gear	Pump	Spring
Packard, 3-ton	6,000	3,400	Opt	Solid			Under hood	4	4.500x5.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Packard, 4-ton	8,000	3,550	Opt	Solid			Under hood	4	4.500x5.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Packard, 5-ton	10,000	4,500	144-68	Solid			Under hood	4	5.000x5.500	40.00	T-head	Pairs	Opp	Gear	Pump	Spring
Packard, 6-ton	12,000	4,650	120-68	Solid			Under hood	4	5.000x5.500	40.00	T-head	Pairs	Opp	Gear	Pump	Spring
Palmer-Meyer, 1-ton	2,000	1,600	118	Solid	34x3	34x4	Under hood	4	3.750x5.500	22.50	L-head	Block	Left	Gear	Pump	Cushions
Palmer-Meyer, 2 1/2-ton	3,000	1,975	130-44	Solid	34x4	34x5	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Spring
Palmer-Moore, C	1,600	1,350	102		36x2	36x3	Under hood	3	4.000x4.000		2-cycle	Sep		Air		
Pathfinder, 1-ton	2,000		120					4	4.125x5.250	27.25	L-head		Side	Gear		
Peerless, 3-ton	6,000	3,700	151-74	Solid	36x4	40x4	Under hood	4	4.500x6.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Peerless, 4-ton	8,000	4,000	151-74	Solid	36x5	40x5	Under hood	4	4.500x6.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Peerless, 5-ton	10,000	4,500	151-74	Solid	38x6	42x6	Under hood	4	4.500x6.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Peerless, 6-ton	12,000		151-74	Solid	38x7	42x7	Under hood	4	4.500x6.500	32.40	T-head	Pairs	Opp	Gear	Pump	Spring
Perfex, 18	1,000	875	116	Pneu	31x3 1/2	31x3 1/2	Under hood	4	3.375x4.000	18.25	T-head	Pairs	Opp	Gear	Pump	Rigid
Pierce-Arrow, X-2	4,000	3,000	150-80	Solid	36x4	36x4*	Under hood	4	4.000x5.500	25.60	T-head	Pairs	Opp	Gear	Pump	Trunn'ns
Pierce-Arrow, R-5	10,000	4,500	Opt	Solid	36x5	40x6*	Under hood	4	4.875x6.000	38.00	T-head	Pairs	Opp	Gear	Pump	Trunn'ns
Pope-Hartford, 3-ton	6,000	3,350	138 1/2	Solid	36x6	36x6*	Seat & hood	4	4.750x5.500	36.10	I-head	Pairs	Head	Gear	Pump	Spring
Pope-Hartford, 5-ton	10,000	4,350	140	Solid	36x7	42x6*	Seat & hood	4	4.750x5.500	36.10	I-head	Pairs	Head	Gear	Pump	Spring
Progress, A	3,000			Solid	36x3 1/2	36x5		4	4.125x5.250	27.25	L-head	Pairs	Side	Gear	Pump	Spring
Progress, B	6,000	3,500		Solid	36x5	36x6		4	4.500x5.500	32.40	L-head	Pairs	Side	Gear	Pump	Spring
Reo, J	4,000	1,650	130-46	Solid	36x4	36x3*	Under hood	4	4.000x4.500	25.60	I-head	Pairs	S & H	Hel'l	Pump	Rigid
Rockford, 1500-lb	1,500	1,500	126	Solid	36x4 1/2	36x4 1/2	Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring
Rockford, 2-ton	4,000	2,500	128	Solid	36x4	36x3 1/2*	Under hood	4	4.250x5.000	28.90	T-head	Pairs	Opp	Gear	Pump	Spring
Sanford, K	2,000	1,660	106	Solid	36x3 1/2	36x3 1/2	Under seat	4	4.000x4.500	25.60	L-head	Pairs	Side	Gear	Pump	Spring
Sanford, L	3,000	1,910	118	Solid	36x3 1/2	36x4	Under seat	4	4.000x4.500	25.60	L-head	Pairs	Side	Gear	Pump	Spring
Saurer, 6 1/2-ton	13,000	5,800					Under hood	4	4.375x5.500	30.63	T-head	Pairs	Opp	Chain	Pump	Rigid
S & S, A	1,500	2,000	136	Solid	36x4 1/2	36x4 1/2	Under hood	4	4.125x5.250	27.25	L-head	Block	Left	Gear	Pump	Rigid
Schacht, 2-ton	4,000	2,650	139	Solid	38x3 1/2	40x3*	Under hood	4	4.250x5.500	28.90	L-head	Block	Right	Gear	Pump	Spring
Selden, J		2,000					Under hood	4	3.750x5.250	22.50	L-head	Block	Left	Gear	Pump	Spring

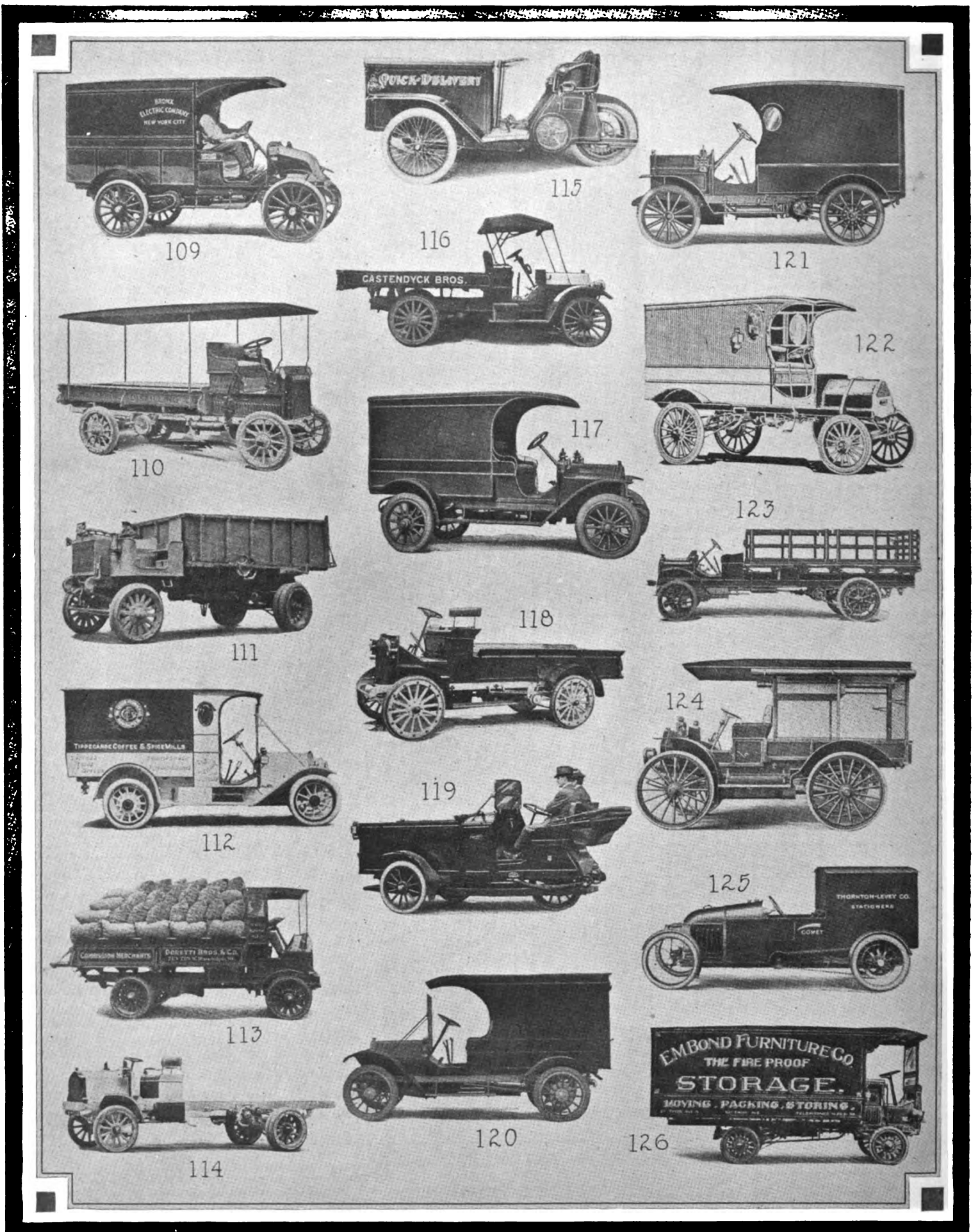
** Drives on four wheels.
 ABBREVIATIONS: Tires: Pneu, pneumatic; *, dual tread. Motor Location: Bot seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head. Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and trunnions. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.

line Commercial Vehicle Chassis in Tabulated Form

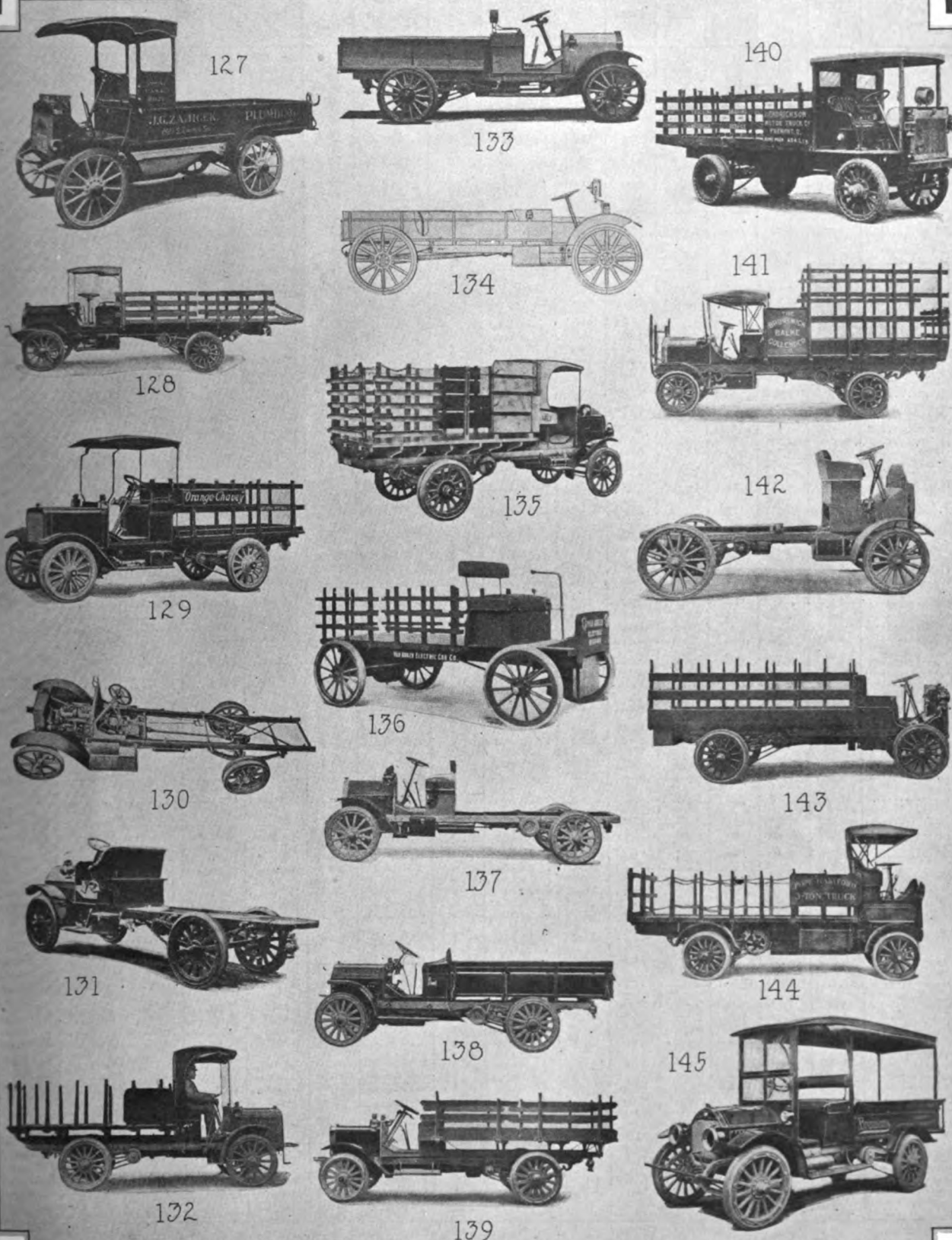
IGNITION			Carburetor	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			Clutch Type	Type	Location	No. Forw'd Speeds	Gear Ratio on High	Final Drive	Front	Rear	Steering	Location Gear-Shift	Gearset		Rear Axle
2-Pt. Doub.	Bosch	Hand	Stromberg	Pressure	Disk	Sel.	Unit J	3	6.60-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, A
		Hand		Pressure	Disk	Sel.	Unit J	3	8.95-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, E
		Hand		Pressure	Disk	Sel.	Unit J	3	9.10-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Martin, L
Dual	Remy	Hand	Schebler	Spl-Pres	Disk	Sel.	Unit M.	3	2.12-1	Bevel	Ell	Plat	Right	Center	Roll	Ball	Menominee, A-3
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	2.12-1	Bevel	Ell	Plat	Right	Center	Roll	Ball	Menominee, B-3
Dual	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Unit M.	3	8.00-1	Bevel	Ell	Plat	Right	Center	Roll	Ball	Menominee, C
Dual	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Unit J.	3	3.50-1	Chain	Ell	Ell	Right	Right	Plain	Plain	M. & E 4-ter
Dual	Remy	Fixed	Own	Spl-Pres	Disk	Plan.	Unit M.	2		Chain	Ell	Ell	Right	Right	Plain	Roll	Mercury, P
Sing.	Opt.	Fixed		Splash	Cone	Sel.	Unit M.	3		Bevel	Ell	Ell	Left	Center	Plain	Roll	Miller, A
Dual	Opt.	Hand	Schebler	Splash	Cone	Sel.	Unit J.	3	6.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, F
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J.	3	7.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, G
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Unit J.	3	9.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Modern, H
Sing.	Eisemann	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3		Chain	Ell	Ell	Left	Center	Ball	Roll	Mogul, L
Dual	Bosch	Hand	Stromberg	Splash	Disk	Sel.	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, G
Dual	Mex	Hand	Stromberg	Splash	Disk	Prog	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, O
Dual	Mex	Hand	Stromberg	Splash	Disk	Prog	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, M
Dual	Mex	Hand	Stromberg	Splash	Disk	Prog	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Mogul, U
Doub.	Mich	Hand	Marvel	Splash	Cone	Sel.	Unit M.	3	8.00-1	Bevel	Ell	Ell	Left	Center	B & R	Roll	Monitor, B
Doub.	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	7.00-1	Bevel	Ell	Ell	Left	Center	B & R	Roll	Monitor, D
Dual	Remy	Hand	Stromberg	Splash	Cone	Sel.	Unit M.	3		Bevel	Ell	Ell	Left	Center	Ball	Ball	Moon, A
Dual	Remy	Gov	Stromberg	Splash	Cone	Sel.	Amid.	3		Chain	Ell	Cross	Left	Center	Ball	Ball	Moon, B
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	3	6.50-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 1 1/2-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	3	6.50-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 2-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	3	8.38-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 3-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	3		Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 4-ton
Dual	Bosch	Hand	Schebler	Splash	Cone	Sel.	Amid.	4	9.82-1	Chain	Ell	Ell	Right	Right	Plain	Roll	Moore, 5-ton
Sing.		Fixed	Stromberg	Splash	Disk	Plan.	Amid.	2	6.50-1	Chain	Ell	Ell	Left	Center	Ball	Ball	Mora, 24
	West'se	Auto	Schebler	Splash	Disk	Sel.	Unit M.	3	5.10-1	T Worm	Ell	Ell	Right	Center	Roll	Roll	Moreland, 1500-lb
	West'se	Auto	Schebler	Splash	Disk	Sel.	Unit M.	3	7.75-1	T Worm	Ell	Ell	Right	Center	Roll	Roll	Moreland, 2-ton
	West'se	Auto	Schebler	Spl-Pres	Disk	Sel.	Amid.	4	10.50-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Moreland, 5-ton
Sing.	U & H	Fixed	Zenith	Pressure	Cone	Sel.	Unit J.	3	7.57-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Natco, 15
Sing.	Bosch	Fixed	Rayfield	Splash	Disk	Sel.	Unit M.	3	7.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-1
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	8.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-2
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	9.50-1	Chain	Ell	Ell	Right	Center	Roll	Roll	Nelson-LeMoon, D-3
Dual	Bosch	Gov	Holley	Spl-Pres	Cone	Sel.	Amid.	3		Chain	Ell	Plat	Right	Right	Ball	Roll	**Nevada, H
Sing.	Bosch	Fixed	Stromberg	Spl-Pres	Cone	Sel.	Unit J.	3		Chain	Ell	Ell	Right	Right	Roll	Roll	New York
Sing.	Bosch	Opt.	Spl-Pres	Cone	Sel.	Unit M.	3	4.00-1	Bevel	Ell	Ell	Left	Center	Plain	Roll	O. K., A	
Sing.	Bosch	Opt.	Spl-Pres	Cone	Sel.	Unit M.	3	8.50-1	Bevel	Ell	Ell	Left	Center	Plain	Roll	O. K., 1-ton	
Dual	Spl'd'f	Hand	Schebler	Splash	Cone	Sel.	Unit X	3		Bevel	Ell	Ell	Right	Center	Ball	Roll	Overland, 79
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 2-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 3-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 4-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 5-ton
Dual	Eisemann	Auto	Own	Splash	Disk	Prog	Unit J.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Packard, 6-ton
Dual	Bosch	Gov	Schebler	Spl-Pres	Disk	Sel.	Unit M.	3	7.00-1	Chain	Ell	Ell	Right	Center	Ball	Roll	Palmer-Meyer, 1-ton
Dual	Bosch	Gov	Stromberg	Spl-Pres	Disk	Sel.	Unit M.	3	6.25-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Palmer-Meyer, 2 1/2-ton
Sing.	Bosch	Fixed	Own	In fuel		Plan.	Amid.	2		Chain	Ell	Ell	Right	Center	Roll	Roll	Palmer-Moore, C
Dual	Eisemann		Schebler	Spl-Pres	Cone	Sel.		3		Bevel	Ell	Ell	Right	Center	Roll	Roll	Pathfinder, 1-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid.	4	7.47-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 3-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid.	4	8.70-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 4-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid.	4	10.50-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 5-ton
Dual	Bosch	Hand	Own	Splash	Cone	Sel.	Amid.	4	10.50-1	Chain	Ell	Ell	Right	Right	B & R	Roll	Peerless, 6-ton
Sing.	Spl'd'f	Fixed	Stromberg	Splash	Cone	Sel.	Amid.	3	4.00-1	Bevel	Ell	Ell	Left	Center	B & R	Ball	Perflex, 18
Sing.	Bosch	Fixed	Own	Pressure	Cone	Sel.	Amid.	3		T Worm	Ell	Ell	Right	Right	Ball	B & R	Pierce-Arrow, X-2
Doub.	Bosch	Hand	Own	Pressure	Cone	Sel.	Amid.	3		T Worm	Ell	Ell	Right	Right	Ball	B & R	Pierce-Arrow, R-5
Dual		Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	11.00-1	Chain	Ell	Ell	Left	Center	Plain	Roll	Pope-Hartford, 3-ton
Dual		Hand	Own	Spl-Pres	Cone	Sel.	Amid.	4	16.20-1	Chain	Ell	Ell	Left	Center	Plain	Roll	Pope-Hartford, 5-ton
Dual	Opt.	Hand	Stromberg	Spl-Pres	Cone	Sel.	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Progress, A
Dual	Opt.	Hand	Stromberg	Spl-Pres	Cone	Sel.	Amid.	3		Chain	Ell	Ell	Right	Right	Ball	Roll	Progress, B
Dual	Nat'l	Hand	Holley	Spl-Pres	Disk	Sel.	Amid.	3	8.78-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Reo, J
Sing.	Pitt'd	Fixed	Stromberg	Splash	Disk	Sel.	Unit M.	3	5.00-1	Bevel	Ell	Ell		Center	Ball	Roll	Rockford, 1500-lb
Sing.	Pitt'd	Fixed	Stromberg	Pressure	Cone	Sel.	Unit J.	3	7.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Rockford, 2-ton
Dual	Remy	Gov	Schebler	Splash	Disk	Sel.	Unit M.	3	9.00-1	Chain	Ell	Plat	Right	Right	Ball	Roll	Sanford, K
Dual	Remy	Gov	Schebler	Splash	Disk	Sel.	Unit M.	3	9.00-1	Chain	Ell	Plat	Right	Right	Ball	Roll	Sanford, L
Sing.	Eisemann	Hand	Own	Pressure	Cone	Sel.	Amid.	4	13.50-1	Chain	Ell	Ell	Right	Right	Ball	Ball	Saurer, 6 1/2-ton
Dual	Bosch	Hand	Rayfield	Splash	Disk	Sel.	Unit M.	3	4.50-1	Bevel	Ell	Ell	Right	Center	Ball	Ball	S & S, A
Doub.		Hand	Schebler	Splash	Cone	Sel.	Amid.	3		T Worm	Ell	Plat	Left	Center	Roll	Roll	Schacht, 2-ton
Dual	Briggs	Hand	Stromberg	Pressure	Disk	Sel.	Unit M.	3	7.82-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Selden, J

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: Ell, semi-elliptic; Ell, elliptic; Ell, elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.

Typical Models of American Motor Wagons and



Trucks That Are Standards for 1914 Production.



Specifications of Three Hundred and Twelve Gaso

NAME AND MODEL	Load Capacity, Pounds	Chassis Price	Wheel-base, Inches	TIRES			Motor Location	No. Cylinders	Bore and Stroke, Inches	S. A. E. H. P.	CYLINDERS		Valve Location	Camshaft Drive	COOLING	
				Kind	Front	Rear					Shape	How Cast			Circulation	Radiator Suspension
Service, J.....	1,500	1,350	115	Solid...	36x3	36x3	Under hood.	4	3.750x5.500	22.50	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, K.....	2,000	1,475	115	Solid...	34x3	34x3	Under hood.	4	3.750x5.500	22.50	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, M.....	3,000	1,675	130	Solid...	34x3	34x4	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, O.....	3,000	1,800	145	Solid...	36x5	36x5	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, P.....	4,000	2,375	150	Solid...	36x4	40x3*	Under hood.	4	4.125x5.500	27.25	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Service, H.....	6,000	2,975	171	Solid...	36x5	40x5*	Under hood.	4	4.250x5.500	28.90	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Siebert, H.....	1,500	1,250	118	Solid...	36x3	36x3	Under hood.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Hel'l...	Thermo...	Springs...
Signal, 1-ton.....	1,500	1,350	115	Solid...	34x3	36x3	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Speedwell, Y.....	4,000	2,850	115	Solid...	36x4	36x3*	Under seat.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Speedwell, Z.....	8,000	3,750	115	Solid...	36x5	36x5*	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Speedwell, X.....	12,000	4,400	139	Solid...	36x6	36x6*	Under seat.	4	5.000x5.000	40.00	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Standard, 3-ton.....	6,000	2,750	Opt.	Solid...	36x5	36x5*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Right...	Gear...	Pump...	Cushions...
Star, B.....	2,000	1,500	120	Solid...	34x3	34x3	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Star, A.....	3,000	1,800	130	Solid...	34x4	36x5	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Stearns, 5-ton.....	10,000	3,800	144	Solid...	34x5	38x5*	Under hood.	4	4.750x6.000	36.10	L-head...	Sep...	Right...	Chain...	Pump...	Springs...
Stearns, 5-ton.....	10,000	3,900	180	Solid...	34x5	38x5*	Under hood.	4	4.750x6.000	36.10	L-head...	Sep...	Right...	Chain...	Pump...	Springs...
Stegeman, 1-ton.....	1,500	1,600	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 1-ton.....	2,000	2,250	130-50	Solid...	34x3	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 2-ton.....	4,000	2,950	142-62	Solid...	34x3	36x3*	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 3-ton.....	6,000	3,500	155	Solid...	36x4	40x4*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Cradle...
Stegeman, 4-ton.....	8,000	3,950	155-75	Solid...	36x5	40x5*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Cradle...
Sternberg, 2-ton.....	4,000	2,800	116-60	Solid...	34x4	36x3*	Under seat.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 2-ton.....	5,000	3,250	148	Solid...	36x4	38x4*	Under hood.	4	4.250x5.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Rigid...
Sternberg, 3-ton.....	6,000	3,400	130-60	Solid...	36x5	40x4*	Under seat.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 4-ton.....	8,000	3,800	144	Solid...	36x5	40x5*	Under seat.	4	4.500x6.750	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 5-ton.....	10,000	4,500	144	Solid...	38x6	42x6*	Under seat.	4	4.500x6.750	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 6-ton.....	12,000	4,750	144	Solid...	38x6	42x6*	Under seat.	4	4.750x6.750	36.10	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Sternberg, 7-ton.....	14,000	5,000	144	Solid...	38x7	42x7*	Under seat.	4	4.750x6.750	36.10	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Stewart, 1-ton.....	1,500	1,500	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Studebaker, 1-ton.....	1,500	1,050	106	Solid...	34x4	34x4	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Left...	Hel'l...	Pump...	Rigid...
Sullivan, 51.....	2,000	1,050	120	Solid...	36x2	36x3	Under hood.	2	4.500x4.500	16.20	L-head...	Sep...	Head...	Gear...	Thermo...	Rigid...
Tiffin, A.....	1,200	1,600	112	Opt...	34x3	34x3	Under hood.	4	3.750x4.500	22.50	L-head...	Block...	Right...	Gear...	Thermo...	Springs...
Tiffin, G.....	2,000	2,000	128	Solid...	36x3	36x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Tiffin, M.....	4,000	2,600	140	Solid...	36x4	38x3*	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Trabold, 1-ton.....	1,500	975	105	Solid...	36x2	38x3	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Side...	Gear...	Thermo...	Trunn'ns.
Trabold, C.....	2,000	1,475	128	Solid...	36x3	38x4	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear...	Pump...	Trunn'ns.
Trabold, 1-ton.....	3,000	1,300	130	Solid...	36x3	38x4	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Right...	Gear...	Pump...	Trunn'ns.
Trabold, 2-ton.....	4,000	2,450	130	Solid...	36x4	38x4*	Under seat.	4	4.250x5.500	28.90	L-head...	Block...	Right...	Gear...	Pump...	Springs...
Transit, F.....	4,000	2,850	144	Solid...	36x4	36x4*	Under seat.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Gear...	Pump...	Springs...
Transit, T.....	7,000	3,500	144	Solid...	36x5*	38x5*	Under seat.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Transit, V.....	10,000	4,500	144	Solid...	36x6	40x6*	Under seat.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Twin City, 2-ton.....	4,000	1,350	104	Solid...	34x3	36x3	Under seat.	2	5.000x5.000	20.00	L-head...	Sep...	Head...	Gear...	Thermo...	Springs...
Universal, C.....	3,000	1,950	130	Solid...	34x3	34x5	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Right...	.....	Pump...	Springs...
Universal, A.....	6,000	3,400	132-50	Solid...	36x5	36x4*	Under seat.	4	4.000x5.500	25.60	T-head...	Pairs...	Opp...	.....	Pump...	Springs...
U. S., E.....	4,000	2,800	132	Solid...	35x3	37x3*	Under hood.	4	4.125x5.250	27.25	L-head...	Block...	Left...	Hel'l...	Pump...	Springs...
U. S., D.....	6,000	3,500	144	Solid...	35x5	37x5*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Hel'l...	Pump...	Springs...
Veerac, B.....	2,000	1,100	86	Solid...	.....	.....	Under floor.	2	4.000x4.000	.....	2-cycle...	Sep...	.....	.....	Air...	.....
Velie, Y.....	4,000	2,850	148-72	Solid...	36x4	36x4*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Velie, Z.....	6,000	3,350	148-72	Solid...	.....	.....	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Vulcan, 2-ton.....	4,000	2,750	144	Solid...	36x4	34x3*	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Vulcan, 3-ton.....	6,000	3,250	150	Solid...	36x5	34x4*	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Vulcan, 4-ton.....	8,000	4,000	162	Solid...	36x6	36x5*	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Vulcan, 4-ton.....	9,000	4,250	162	Solid...	36x6	36x5*	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Vulcan, 5-ton.....	10,000	4,500	162	Solid...	36x6	36x6*	Under hood.	4	4.375x5.500	30.63	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Vulcan, 7-ton.....	14,000	6,000	156	Solid...	36x7	42x7*	Under hood.	4	4.750x5.500	36.10	L-head...	Pairs...	Left...	Gear...	Thermo...	Trunn'ns.
Wade, Delivery.....	800	400	72	Solid...	36x2	36x2	Under body.	1	4.500x6.000	8.10	L-head...	.....	Left...	Gear...	Air...	.....
Wagenhals.....	800	.....	80	.....	30x3	34x4	.....	4	3.500x3.375	19.60	L-head...	Pairs...	Right...	Gear...	Pump...	Rigid...
Ware, A.....	.....	3,000	Opt.	.....	.....	.....	Under hood.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Trunn'ns.
White, GBBE.....	1,500	2,100	133	Pneu...	34x4	34x4	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, TBC.....	3,000	3,000	145	Pneu...	36x4	36x4*	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, GTA.....	6,000	3,700	163	Solid...	36x5	40x4*	Under hood.	4	3.750x5.125	22.50	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
White, TC.....	10,000	4,500	165	Solid...	36x5	40x6*	Under hood.	4	4.250x5.750	28.90	L-head...	Block...	Right...	Hel'l...	Pump...	Springs...
Wichita, A.....	2,000	1,650	110	Solid...	34x3	34x4	Under hood.	4	3.250x5.000	16.90	L-head...	Block...	Left...	Gear...	Thermo...	Springs...
Wichita, B.....	4,000	2,100	118	Solid...	34x3	34x3*	Under hood.	4	3.500x5.000	19.60	L-head...	Block...	Left...	Gear...	Thermo...	Springs...
Wichita, H.....	7,000	3,250	162	Solid...	36x5	36x5*	Under hood.	4	4.250x6.750	28.90	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Wilcox, L.....	2,000	1,24	118	.....	.....	.....	.....	4	4.125x5.250	27.25	.....	.....	.....	.....	.....	.....
Wilcox, N.....	4,000	1,18	118	.....	.....	.....	.....	4	4.250x4.500	28.90	.....	.....	.....	.....	.....	.....
Wilcox, JA.....	6,000	1,28	128	.....	.....	.....	.....	4	4.250x5.000	28.90	.....	.....	.....	.....	.....	.....
Willys, Utility 65.....	1,500	1,350	120	.....	34x4	36x3	Under hood.	4	4.125x4.500	27.25	L-head...	Sep...	Left...	Gear...	Thermo...	Springs...
Willet, M.....	1,500	1,650	125	Pneu...	34x4	34x4	Under hood.	4	3.750x5.250	22.50	L-head...	Block...	Left...	Gear...	Pump...	Rigid...
Willet, L.....	6,000	2,800	144-68	Solid...	36x4	36x4*	Under hood.	4	4.500x5.500	32.40	L-head...	Pairs...	Left...	Gear...	Pump...	Springs...
Zimmerman.....	.....	.....	.....	.....	.....	.....	Under hood.	2	4.750x4.000	18.00	L-head...	Sep...	S & H...	Gear...	Air...	.....

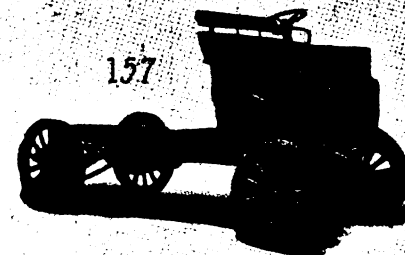
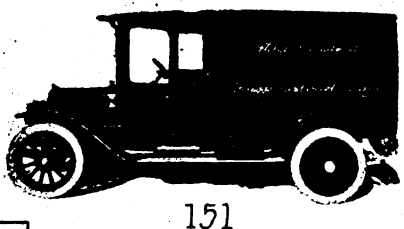
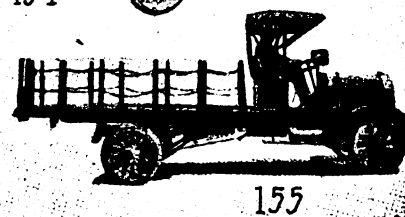
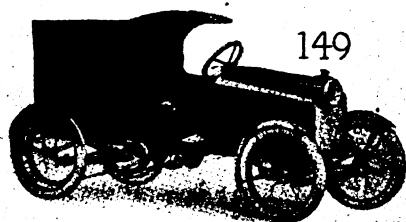
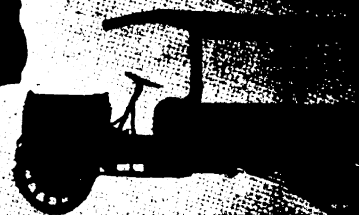
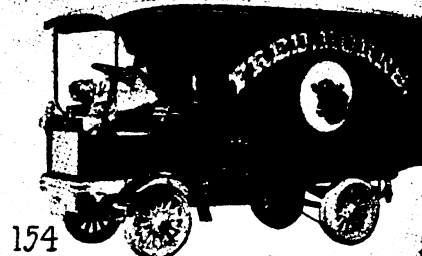
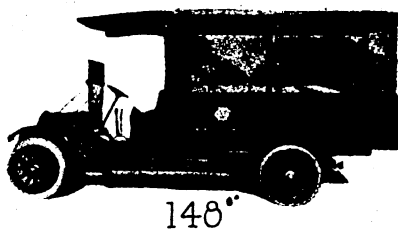
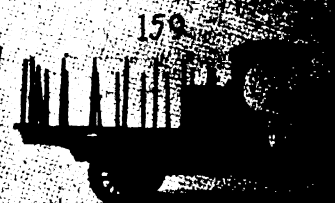
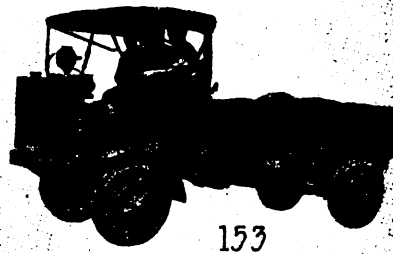
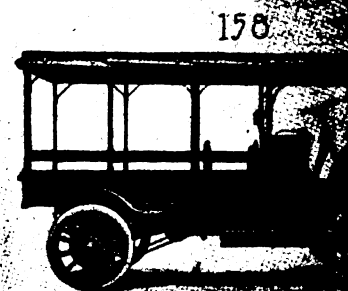
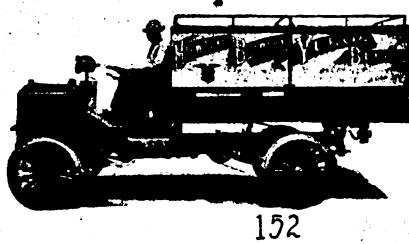
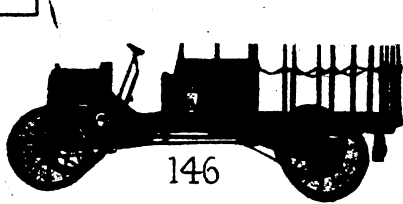
** Drives on four wheels.
 ABBREVIATIONS:—Tires: Pneu, pneumatic; *, dual tread. Motor Location: Bet Seats, between seats. Cylinders: Sep, separately cast. Valve Location: Opp, opposite; S & H, side and head.
 Camshaft Drive: Gear, type not known; Hel'l, helical. Cooling: Thermo, thermo-siphon. Radiator Suspension: S & T, springs and transoms. Ignition: Sing, single; Doub, double; 2-Pt, two point; Auto, automatic; Gov, governed; Opt, optional. Motor Lubrication: Spl-pres, splash and pressure. Clutch: Exp bd, expanding band; Con bd, contracting band.

line Commercial Vehicle Chassis in Tabulated Form

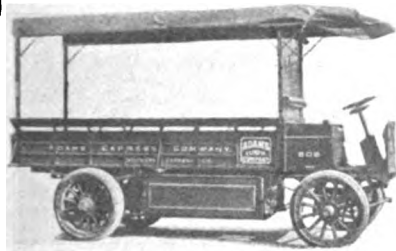
IGNITION			Carbure r	Motor Lubrication	TRANSMISSION					RUNNING GEAR				BEARINGS		NAME AND MODEL	
System	Magneto	Control			GEARSET			Gear Ratio on High	Final Drive	SPRINGS		CONTROL		Gearset	Rear Axle		
					Clutch Type	Type	Location			No. Forw'd Speeds	Front	Rear	Steering				Gear-Shift
Dual	Briggs	Hand	Stromberg	Splash		Fric				Chain	Ell	Ell	Left	Left			Service, J
Dual	Briggs	Hand	Stromberg	Splash		Fric				Chain	Ell	Ell	Left	Left			Service, K
Dual	Briggs	Hand	Stromberg	Splash		Fric				Chain	Ell	Ell	Left	Left			Service, M
Sing	Eisemann	Fixed	Stromberg	Splash	Cone	Sel	Amid	3		Chain	Ell	Ell	Left	Center			Service, Q
Sing	Eisemann	Hand	Stromberg	Splash	Cone	Sel	Amid	3		Chain	Ell	Ell	Left	Center			Service, P
Sing	Eisemann	Fixed	Stromberg	Splash	Cone	Sel	Amid	3		Chain	Ell	Ell	Left	Center			Service, H
Sing	Mea	Hand	Carter	Splash	Cone	Sel	Unit J	3		Chain	Ell	Ell	Left	Center	Ball	Ball	Siebert, H
Sing	Eisemann	Fixed	Stromberg	Splash	Cone	Sel	Unit J	3	7.50-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Signal, 1-ton
Sing	Eisemann	Auto	Schebler	Splash	Cone	Sel	Amid	3	9.36-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Speedwell, Y
Sing	Eisemann	Auto	Schebler	Splash	Cone	Sel	Amid	3	10.28-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Speedwell, Z
Sing	Eisemann	Auto	Schebler	Splash	Cone	Sel	Amid	3	10.28-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Speedwell, X
Sing	Eisemann	Auto	Stromberg	Spl-Pres	Disk	Sel	Unit M	3	8.95-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Standard, 3-ton
Opt	Opt	Hand	Opt	Splash	Disk	Sel	Unit M	3	8.50-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Star, B
Opt	Opt	Hand	Opt	Splash	Cone	Sel	Unit J	3	8.50-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Star, A
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel	Amid	4	9.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Stearns, 5-ton
Dual	Bosch	Hand	Stromberg	Spl-Pres	Disk	Sel	Amid	4	9.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Stearns, 5-ton
Sing	Eisemann	Gov	Carter	Spl-Pres	Disk	Sel	Unit M	3		Bevel	Ell	Ell	Left	Center	Ball	Ball	Stegeman, 1-ton
Sing	Eisemann	Gov	Carter	Spl-Pres	Disk	Sel	Unit M	3		Chain	Ell	Ell	Left	Center	Ball	Ball	Stegeman, 1-ton
Sing	Eisemann	Gov	Carter	Spl-Pres	Disk	Sel	Unit M	3		Chain	Ell	Ell	Left	Center	Ball	Ball	Stegeman, 2-ton
Sing	Eisemann	Gov	Carter	Spl-Pres	Disk	Sel	Unit M	3		Chain	Ell	Ell	Left	Center	Ball	Ball	Stegeman, 3-ton
Sing	Eisemann	Gov	Carter	Spl-Pres	Disk	Sel	Unit M	3		Chain	Ell	Ell	Left	Center	Ball	Ball	Stegeman, 4-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	5.77-1	Chain	Ell	Plat	Right	Right	Ball	Roll	Sternberg, 2-ton
Sing	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	7.75-1	T Worm	Ell	Ell	Left	Center	Ball	Roll	Sternberg, 2-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Sternberg, 3-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	10.40-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Sternberg, 4-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	11.22-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Sternberg, 5-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	9.84-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Sternberg, 6-ton
Dual	Eisemann	Auto	Holley	Splash	Disk	Sel	Amid	3	11.22-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Sternberg, 7-ton
Sing	Bosch	Fixed	Mayer	Spl-Pres	Disk	Sel	Amid	3		Bevel	Ell	Ell	Left	Center	Roll	Roll	Stewart, 1-ton
Dual	Remy	Hand	Schebler	Spl-Pres	Cone	Sel	Unit X	3	4.60-1	Bevel	Ell	Ell	Left	Center	Roll	Roll	Studebaker, 1-ton
Sing	Bosch	Fixed	Schebler	Spl-Pres	Disk	Plan	Unit J	2		Chain	Ell	Ell	Left	Center	Ball	Ball	Sullivan, 51
Sing	Bosch	Hand	Breeze	Splash	Cone	Sel	Unit J	3	6.67-1	Chain	Ell	Ell	Left	Center	Roll	Ball	Tiffin, A
Sing	Bosch	Hand	Schebler	Splash	Cone	Sel	Unit J	3	8.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Tiffin, G
Sing	Bosch	Hand	Schebler	Splash	Cone	Sel	Unit J	3	10.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Tiffin, M
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Plan	Unit J	2	7.50-1	Chain	Ell	Ell	Left	Center	Ball	Ball	Trabold, 1-ton
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Sel	Unit M	3	8.00-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Trabold, C
Dual	Briggs	Hand	Stromberg	Spl-Pres	Cone	Sel	Unit J	3	8.00-1	Chain	Ell	Ell	Left	Center	Ball	Roll	Trabold, 1-ton
Dual	Briggs	Hand	Stromberg	Spl-Pres	Disk	Sel	Unit M	3	8.50-1	T Worm	Ell	Ell	Left	Center	Roll	Roll	Trabold, 2-ton
Sing	Mea	Hand	Rayfield	Splash	Disk	Sel	Unit J	3	9.00-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Transit, F
Sing	Mea	Hand	Rayfield	Splash	Disk	Sel	Unit J	3	10.74-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Transit, T
Sing	Mea	Hand	Rayfield	Splash	Disk	Sel	Unit J	3	13.00-1	Chain	Ell	Ell	Right	Right	Roll	Roll	Transit, V
Sing	K W	Hand	Schebler	Spl-Pres	Disk	Plan	Unit J	2	10.00-1	Chain	Ell	Ell	Right	Right	Roll	Ball	Twin City, 2-ton
Dual	Eisemann	Hand	Zephyr	Splash	Disk	Sel	Unit M	3		T Worm	Ell	Ell	Left	Center	B & P	Roll	Universal, C
Dual	Eisemann	Hand	Zephyr	Splash	Disk	Sel	Unit J	3		Chain	Ell	Ell	Right	Center	Roll	Roll	Universal, A
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Ind C	Amid	3	8.00-1	Chain	Ell	Ell	Left	Center	Ball	Roll	U. S., E
Dual	Bosch	Hand	Stromberg	Spl-Pres	Cone	Ind C	Amid	3	7.80-1	Chain	Ell	Ell	Left	Center	Ball	Roll	U. S., D
Doub	Opt	Hand	Krice	In fuel	Disk	Plan	Amid	2	6.20-1	Chain	Ell	Ell	Left	Left	Ball	Ball	Veearc, B
Dual	Bosch	Fixed	Stromberg	Splash	Disk	Sel	Amid	3		Chain	Ell	Ell	Right	Right	Roll	Roll	Velie, Y
Dual	Bosch	Fixed	Stromberg	Splash	Disk	Sel	Amid	3		Chain	Ell	Ell	Right	Right	Roll	Roll	Velie, Z
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 2-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 3-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 4-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 4-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	3	7.90-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 5-ton
Dual	Bosch	Hand	Stromberg	Splash	Cone	Sel	Amid	4	11.40-1	Chain	Ell	Ell	Right	Right	Ball	Roll	Vulcan, 7-ton
Sing	Wyco	Hand	Schebler	Splash	Disk	Sel	Unit J	2	5.00-1	Chain	Ell	Ell	Right	Right	Plain	Plain	Wade, Delivery
Dual	Spl'd'f	Hand	Marvel	Splash	Cone	Plan	Unit M	2	6.00-1	Chain	Ell	Ell	Center	Pedal	Roll	Roll	Wagenhals
Sing	K W	Hand	Holley	Spl-Pres	Disk	Sel	Amid	3		Bevel	Ell	Ell	Right	Right	Roll	Roll	Ware, A
Sing	Bosch	Hand	Own	Spl-Pres	Cone	Sel	Amid	4		Bevel	Ell	Ell	Left	Center	Ball	Ball	White, GBBE
Sing	Bosch	Hand	Own	Spl-Pres	Cone	Sel	Amid	4		Bevel	Ell	Ell	Left	Center	Ball	Ball	White, TBC
Sing	Bosch	Hand	Own	Spl-Pres	Cone	Sel	Amid	4		Chain	Ell	Ell	Left	Center	Ball	Ball	White, GTA
Sing	Bosch	Hand	Own	Spl-Pres	Cone	Sel	Amid	4		Chain	Ell	Ell	Left	Center	Ball	Ball	White, TC
Opt	Opt	Hand	Opt	Spl-Pres	Cone	Sel	Unit J	3	7.32-1	Chain	Ell	Ell	Right	Center	Roll	Ball	Wichita, A
Opt	Opt	Hand	Opt	Spl-Pres	Cone	Sel	Unit J	3	8.25-1	Chain	Ell	Ell	Right	Center	Roll	Ball	Wichita, B
Dual	Opt	Hand	Opt	Spl-Pres	Cone	Sel	Unit J	3	9.39-1	Chain	Ell	Ell	Left	Center	Roll	Roll	Wichita, H
Dual	Mea			Splash	Cone	Sel		3			Ell	Plat	Right	Center	Roll	Roll	Wilcox, L
Dual	Bosch			Splash	Cone	Sel		3			Ell	Plat			Roll	Roll	Wilcox, N
Dual	Bosch			Splash	Cone	Sel		3			Ell	Plat			Roll	Roll	Wilcox, JA
Dual	Spl'd'f	Hand	Schebler	Splash	Cone	Sel	Amid	3	6.62-1	Chain	Ell	Ell	Right	Center	Ball	Roll	Willys Utility, 65
Sing	Eisemann	Auto	Zenith	Spl-Pres	Cone	Sel	Amid	3		Bevel	Ell	Ell	Left	Center	Roll	Roll	Williet, M
Sing	Eisemann	Auto	Zenith	Spl-Pres	Cone	Sel	Amid	3		Chain	Ell	Ell	Left	Center	Roll	Roll	Williet, L
Sing	At Kent	Hand	Schebler	Spl-Pres	Plan	Amid		2	2.00-1	Chain	Ell	Ell	Right	Right	Plain	Ball	Zimmerman

ABBREVIATIONS:—Gearset: Sel, selective; Prog, progressive; Plan, planetary; Fric, friction; Ind C, individual clutch. Gearset Location: Amid, amidships; Unit M, unit with the motor; Unit J, unit with the jackshaft; Unit X, unit with the rear axle. Final Drive: Int G, internal gear; Bevel, shaft with bevel; T Worm, shaft with top worm; Chain, by chain to the rear wheels. Springs: Ell, semi-elliptic; Ell, elliptic; Ell, elliptic; Plat, platform. Bearings: Roll, roller; B & R, ball and roller; Opt, optional.

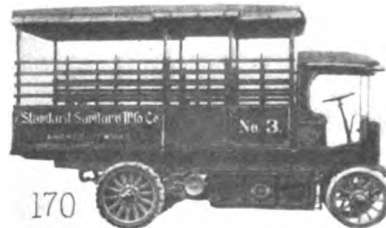
Typical Models of American Motor Wagons and



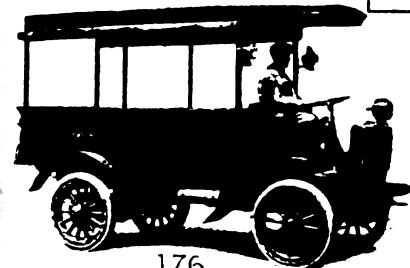
Trucks That Are Standards for 1914 Production.



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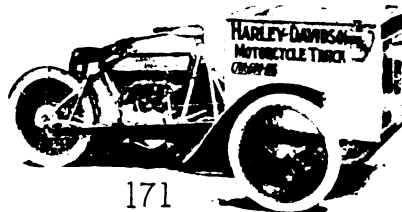
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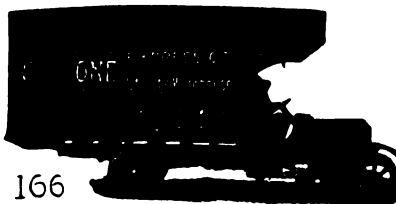
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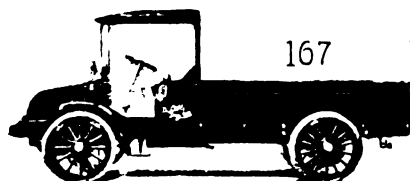
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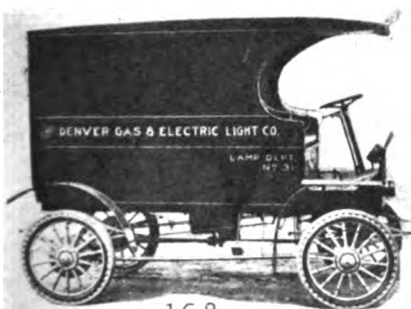
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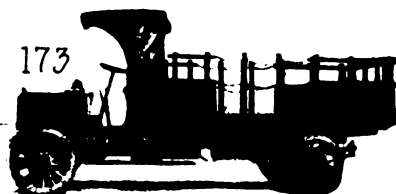
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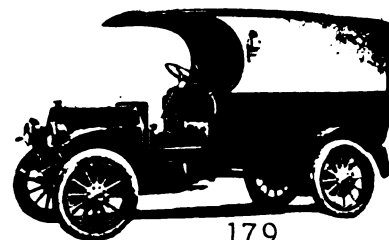
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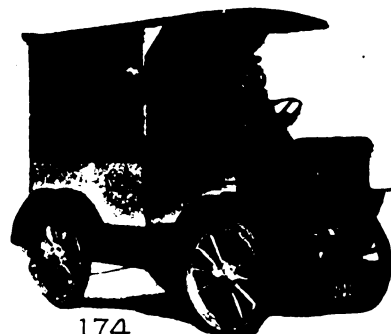
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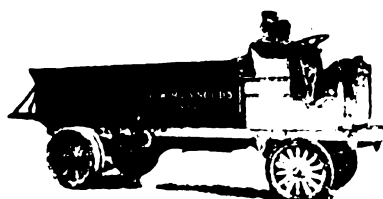
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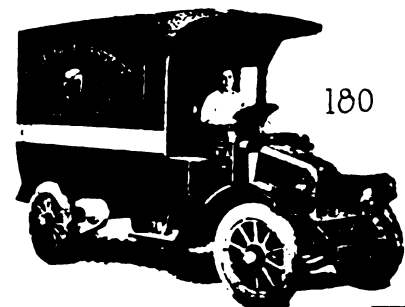
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PARK BUYS MOSLER FACTORY.

The purchase of one of the most modern and best equipped factories of the kind in America by a park system, with the intention of eventual demolition, was the decidedly unusual transaction by which the plant of A. R. Mosler & Co., Mount Vernon, N. Y., passed into the hands of the Bronx Parkway Commission, which purposes to utilize the site in carrying out its plans to beautify the section of New York City of which it has control. The price paid for the property is said to be \$93,000. Mr. Mosler will have six months to establish his business elsewhere, and the statement is made that when it takes place the business will be organized with a department for producing spark plugs and another for the manufacture of screw machines, which he specializes.

U. S. TIRE SALES LARGE.

In the annual report of President Samuel P. Colt of the United States Rubber Company, which covers a period of nine months for all the subsidiary companies, and for 12 months for several of the concerns, the statement is made that while 1913 was a year of falling prices the volume of business transacted during the last nine months of 1913 was larger than for the corresponding period of 1912, although a given quantity of manufactured stock would necessarily represent less because of the difference in the market value. The sales of tires by the United States Tire Company showed a substantial increase, and considering the variance in demand for some of the other products, from weather and other conditions, this was very gratifying.

The net profit of the company for the nine months was \$9,677,532.81, and the surplus earnings, after paying dividends, was \$1,046,611.58, and at the end of the year the company had on hand approximately \$10,000,000 in cash. The surplus carried as a liability in the statement is \$19,129,504, of which \$350,156 pertains to minority stock interests. The net sales for the year reached the total of \$87,349,692. The report is regarded as very satisfactory and encouraging.

STANDARD TYPES OF 1914 MO

Index of Illustrations Which Show One Representative line and Electric

The makes are arranged alphabetically, and referring to the index this pre designation of the body equipment illustrated, the number of the illustration

Name	Maker	Model	Capacity	No.	Page
A. & R.	Abendroth & Root Mfg. Co.	—	6,000	154	242
Adams	Adams Bros. Co.	D	3,000	28	227
Alma	Republic Motor Truck Co.	—	2,000	138	239
American-La France	American-LaFrance Fire Eng. Co.	—	10,000	111	238
Armleder	Armleder Co., O.	H	3,000	102	235
Atterbury	Atterbury Motor Car Co.	R	2,000	9	226
Auglaize	Auglaize Motor Car Co.	H	1,500	44	238
Autocar	Autocar Co.	XXI-F	3,000	176	243
Available	Available Truck Co.	25	2,000	12	226
Avery	Avery Co.	B	6,000	94	235
Barker	Barker, C. L.	U	2,000	89	234
Beck	Cedar Rapids Auto Works.	F	4,000	76	234
Bessemer	Bessemer Motor Truck Co.	A	4,000	173	243
Blair	Blair Mfg. Co.	C	3,000	63	231
Best	Durant-Dort Carriage Co.	—	1,000	13	226
Brockway	Brockway Motor Truck Co.	G	1,000	161	242
Bulck	Bulck Motor Co.	3	1,000	179	243
Butler	Huseltan Motor Car Co.	—	1,500	24	227
Chase	Chase Motor Truck Co.	H	2,500	122	238
Clark	Clark Delivery Wagon Co.	—	2,000	4	226
Coleman	Coleman Carriage & Harness Co.	B	2,000	52	230
Comet	Comet Cycle Car Co.	C	300	125	238
Commerce	Commerce Motor Car Co.	H	1,000	14	226
Continental	Continental Truck Mfg. Co.	AE	3,000	157	242
Corbitt	Corbitt Automobile Co.	F	2,500	3	226
Couple-Gear	Couple-Gear Freight-Wheel Co.	AC	10,000	38	230
Crawford	Crawford Automobile Co.	—	6,000	128	239
Croce	Croce Automobile Co.	A	2,000	67	231
Crown	Crown Commercial Car Co.	B	3,000	130	239
Danielson	Danielson Engineering Works.	A	3,000	143	239
Dart	Dart Mfg. Co.	B	2,000	133	239
Dayton	Dayton Auto Truck Co.	A	2,000	167	243
DeKalb	DeKalb Wagon Co.	D-2	4,000	131	239
Diamond T.	Diamond T Motor Co.	J	3,000	61	231
Dispatch	Dispatch Motor Car Co.	L	1,250	106	235
Dorris	Dorris Motor Car Co.	—	1,500	151	242
Duplex	Duplex Power Car Co.	B-2	4,000	15	226
Duro	Amalgamated Motors Corp.	—	4,000	33	227
Erie	Erie Truck Mfg. Co.	—	3,000	71	231
Fargo	Fargo Motor Car Co.	E	1,500	127	239
Federal	Federal Motor Truck Co.	—	3,000	137	239
Four-Wheel Drive	Four-Wheel Drive Auto Co.	G	3,000	73	234
G. V.-Mercedes	General Vehicle Co.	F	12,000	104	235
Gabriel	Gabriel Auto Co.	L	3,000	81	234
Garford	Garford Co.	J	6,000	108	235
Gay	Gay Co., S. G.	G	3,000	116	238
Gramm's	Gramm-Bernstein Co.	—	7,000	46	230
GMC	General Motors Truck Co.	VC	2,500	64	231
Hahn	Hahn Motor Truck & Wagon Co.	—	3,000	40	230
Harder	Harder Auto Truck Co.	—	6,000	126	238
Harley-Davidson	Harley-Davidson Motor Co.	—	500	171	243
Harvey	Harvey Motor Truck Works.	F	3,000	29	227
Henderickson	Henderickson Motor Truck Co.	—	8,000	140	239
Horner	Detroit-Wyandotte Motor Co.	—	4,000	74	234
Hupp	Hupp Motor Car Co.	—	750	86	231
Hurlburt	Hurlburt Motor Truck Co.	A	6,000	57	231
IHC	International Harvester Co.	MW	1,000	124	238
Ideal	Ideal Automobile Co.	I	1,000	158	242
Imp	Imp Cyclecar Co.	X	300	156	242
Interboro	Interboro Motor Truck Co.	A	2,000	105	235
Jeffery	Jeffery Co., Thomas B.	—	3,000	153	242
Kalamazoo	Kalamazoo Motor Vehicle Co.	B	3,000	132	239
Kearns	Kearns Motor Truck Co.	A	1,500	7	226
Kelly	Kelly-Springfield M. T. Co.	K-40	6,000	93	235
King	King Mfg. Co., A. R.	—	7,000	172	243
KisselKar	Kissel Motor Car Co.	—	2,000	159	242
Knox	Knox Automobile Co.	R-3	2,000	175	243
Knox-Martin	Knox Automobile Co.	—	20,000	92	235
Koehler	Koehler Sporting Goods Co., H. J.	—	2,000	54	230
Krebs	Krebs Commercial Car Co.	BB	1,500	23	227
Krit	Krit Motor Car Co.	KD	1,000	41	230
Lambert	Buckeye Mfg. Co.	V-5	4,000	69	231
Landshaft	Landshaft & Sons.	J	3,000	20	227
Lange	Lange Motor Truck Co.	B	4,000	80	234
Lauth-Juergens	Lauth-Juergens Motor Car Co.	L	4,000	49	230
Lewis	Lewis Motor Truck Co.	21	5,000	155	242
Light	Light Commercial Car Co.	—	750	115	238
Lippard-Stewart	Lippard-Stewart Motor Car Co.	B	1,500	91	235
Little Giant	Chicago Pneumatic Tool Co.	H	2,000	118	238
Locomobile	Locomobile Co. of America.	A	10,000	65	231
Lord Baltimore	Lord Baltimore Motor Truck Co.	B	2,000	79	234
Luck Utility	Cleburne Motor Car Mfg. Co.	—	1,000	134	239
Maccarr	Maccarr Co.	C	3,000	148	242
Mack	International Motor Co.	—	10,000	77	234
Mais	Mais Motor Truck Co.	D	3,000	19	227
Mansur	Mansur Motor Truck Co.	—	3,000	90	234
Marmon	Nordyke & Marmon Co.	—	2,000	112	238
Martin	Martin Carriage Works.	S	3,000	178	243
Maxim	Maxim Tricar Mfg. Corp.	F	750	147	242
McIntyre	McIntyre Co., W. H.	III	1,000	121	238

TOR WAGONS AND TRUCKS.

Model Produced by 179 Different Manufacturers of Gaso-Service Vehicles.

sents the name of the manufacturer, the location of the executive office, the and the page on which it may be found.

Name	Maker	Model	Capacity	No.	Page
Menominee	Poyer Co., D. F.	C	3,000	39	230
Merchant & Evans	Merchant & Evans	—	10,000	100	235
Mercury	Mercury Mfg. Co.	P-2	1,000	177	243
Merz	Merz Cyclecar Co.	—	500	149	242
Michaelson	Shapiro-Michaelson Motor Car Co.	—	300	101	235
Miller	Kosmath Co.	A	1,000	120	238
Minneapolis	Minneapolis Motor Co.	—	500	163	242
Modern	Bowling Green Motor Car Co.	G	1,000	95	235
Mogul	Mogul Motor Truck Co.	O	8,000	169	243
Monitor	Monitor Automobile Works	E	2,000	142	239
Moon	Moon Buggy Co., J. W.	A	1,000	117	238
Moore	Pacific Metal Products Co.	B	4,000	107	235
Mora	Mora Power Wagon Co.	24	2,000	53	230
Moreland	Moreland Motor Truck Co.	—	2,500	110	238
Motokart	Tarrytown Motor Car Co.	1	500	36	230
Natco	National Motor Truck Co.	15	2,000	17	226
Nelson & LeMoon	Nelson & LeMoon	D-2	4,000	58	231
Nevada	Nevada Mfg. Co.	H	6,000	50	231
New York	Tegetmeier & Riepe Co.	L	3,000	1	226
Old Reliable	Old Reliable Motor Truck Co.	—	4,000	113	238
O. K.	Star-Tribune Motor Sales Co.	B	2,000	129	239
Packard	Packard Motor Car Co.	—	8,000	114	238
Palmer	Palmer-Meyer Motor Car Co.	—	2,000	145	239
Palmer-Moore	Palmer-Moore Co.	C	2,000	109	238
Peerless	Peerless Motor Car Co.	—	6,000	48	230
Perfex	Perfex Co.	Z	1,000	45	230
Pierce-Arrow	Pierce-Arrow Motor Car Co.	R-4	10,000	21	227
Pope-Hartford	Pope Mfg. Co.	—	6,000	144	239
Reo	Reo Motor Truck Co.	J	4,000	135	239
Robinson	Robinson Motor Truck Co.	F	3,000	8	226
Rowe	Rowe Motor Co.	C	3,000	66	231
Sandow	Sandow Truck Co.	—	3,000	2	226
Sandusky	Sandusky Auto Parts & M. T. Co.	B	1,500	180	243
Schacht	Schacht Motor Truck Co., G. A.	—	4,000	150	242
Selden	Selden Motor Vehicle Co.	JL	2,000	59	231
Service	Service Motor Car Co.	K	2,000	22	227
Siebert	Shop of Siebert	H	1,500	31	227
Signal	Signal Motor Truck Co.	D	1,500	43	230
Smith-Milwaukee	Smith Co., A. O.	—	7,000	166	243
South Bend	South Bend Motor Car Works	30	4,000	99	235
Speedwell	Speedwell Motor Car Co.	Z	8,000	35	227
Standard	Standard Motor Truck Co.	—	6,000	11	226
Standard	Standard Motor Truck Co.	A	2,000	60	231
Star	Star Motor Car Co.	A	3,000	139	239
Starbuck	Starbuck Auto Co.	—	3,000	72	231
Stearns	Stearns Co., F. B.	—	10,000	55	231
Stegeman	Stegeman Motor Car Co.	—	4,000	98	235
Sternberg	Sternberg Mfg. Co.	—	4,000	70	231
Stewart	Stewart Iron Works	B	1,500	162	242
Stewart	Stewart Motor Corp.	C	2,000	83	234
Studebaker	Studebaker Corp.	—	1,500	6	226
Sullivan	Sullivan Motor Car Co.	51	2,000	146	242
Tiffin	Tiffin Wagon Co.	G	2,000	160	242
Trabold	Trabold Truck Mfg. Co.	—	3,000	26	227
Transit	Transit Motor Truck Co.	F	4,000	165	243
Twin City	Brasie Motor Truck Co.	—	4,000	62	231
United States	United States Motor Truck Co.	D	6,000	141	239
Universal	Universal Motor Truck Co.	C	3,000	51	230
Velle	Velle Motor Vehicle Co.	Z	6,000	5	226
Veerac	Veerac Motor Co.	—	1,500	10	226
Vim	Touraine Co.	—	600	174	243
Vulcan	Driggs-Seabury Ordnance Co.	—	10,000	18	226
Wade	Wade Commercial Car Co.	—	750	84	234
Wagenhals	Wagenhals Motor Co.	—	750	119	238
Walter	Walter Motor Truck Co.	—	6,000	25	227
White	White Co.	GTA	6,000	123	238
White Star	White Star Motor & Eng. Co.	E	6,000	75	234
Wichita	Wichita Falls Motor Co.	A	2,000	152	242
Wilcox	Wilcox Motor Co., H. E.	JA	6,000	37	230
Willet	Willet Engine & Truck Co.	M	1,500	47	230
Willys-Utility	Willys-Overland Co.	—	1,500	16	226
Witt-Will	Witt-Will Co.	E-14	2,000	56	231
Wisconsin	Wisconsin Motor Truck Works	A	3,000	88	234
ELECTRIC WAGONS AND TRUCKS.					
Argo	American Electric Car Co.	L-10	1,000	78	234
Atlantic	Atlantic Vehicle Co.	1-C	2,000	27	227
Baker	Baker Motor Vehicle Co.	CC	7,000	193	235
Buffalo	Buffalo Electric Vehicle Co.	—	1,500	30	227
Capitol	Capitol Truck Mfg. Co.	—	2,000	97	235
Commercial Truck	Commercial Truck Co. of America	D	4,000	164	243
Couple-Gear	Couple-Gear Freight-Wheel Co.	A-9	10,000	42	230
Detroit	Anderson Electric Car Co.	—	3,000	68	231
Fritchle	Fritchle Auto & Battery Co.	—	1,000	168	243
GMC	General Motors Truck Co.	3	3,000	32	227
G. V.	General Vehicle Co.	—	2,000	82	234
Heubner	Huebner, O. E.	6	500	34	227
Urban	Kentucky Wagon Co.	70	7,000	170	243
Van Auken	Van Auken Electric Car Co.	A	750	136	239
Walker	Walker Vehicle Co.	E	7,000	85	234
Waverley	Waverley Co.	—	3,000	96	235

HOOD SUCCEEDS WILCOX.

The Standard Motor Truck Company, Detroit, Mich., has named Wallace C. Hood as sales manager to succeed George D. Wilcox. Mr. Hood was formerly sales manager for the Chalmers Motor Company and the Empire Automobile Company, and is widely known in the automobile industry, though he has been identified with the marketing of pleasure vehicles the greater part of the time.

CONTRACTOR BUYS TRUCKS.

The Holbrook, Cabot & Rollins Company, Springfield, Mass., which has the contract to build the Dwight street underpass, an important railroad construction that will shortly be begun, has purchased two Pierce-Arrow five-ton trucks, equipped with hydraulic hoists and dumping bodies, which will be used in this work. The delivery is to be made as quickly as possible.

COMMERCE AGENTS DINED.

The Commerce Motor Car Company of Illinois, the concern that markets the Commerce 1000-pound delivery wagon in the State of Illinois, with headquarters in Chicago and with representatives in the principal cities and towns, recently entertained its agents at dinner at the Sherman house, Chicago, there being a large number of the dealers and salesmen present. Among the guests were several of the officials of the Commerce Motor Car Company from Detroit, and chief among them were those having to do with the marketing of the machines. The social feature of the event was of importance, but the principal purpose of the gathering was to promote the spirit of co-operation and to discuss plans for the very active campaign which has been inaugurated. The enthusiasm created was of a character that was very satisfactory and will undoubtedly be productive of excellent results.

The New England Telephone & Telegraph Company has purchased a two-ton Pierce-Arrow truck for use at its Springfield, Mass., headquarters.

CHASSIS AND BODY EQUIPMENT DATA.

The Types of Bodies Supplied as Stock by Manufacturers Designated by Models, and the Available Loading Space of Each, with Factory Prices.

NO DETAIL of motor vehicle construction is of greater importance to the man seeking information than the dimensions of the space in which freight can be carried. The inquirer is justified in believing that the engineer designed a given chassis to carry a specified maximum load in all working conditions, and that with a standard type of body the weight will be so distributed that there will be no excessive stress upon any component.

While it is undoubtedly true that a body specially built for a work has advantages that appeal to many, and for many purposes is a necessity, there are many kinds of service for which what are known as standard bodies may be utilized with excellent satisfaction, and many of the manufacturers of motor wagons and trucks produce such equipment and are ready to provide it if desired. The special body is necessarily more expensive than one produced to stock specifications, and while the difference in cost is no real reason why the latter should be preferred, there is no doubt that equipment furnished by the builder of a chassis of known quality is well installed and is constructed to

conform to all the characteristics of the machine. By that is meant that the load, if reasonably distributed, will not be excessive, and the use of the vehicle will be more satisfactory than were it fitted with a body that is built to meet a purchaser's ideas and without regard to the requirements of the design.

The following tabulation of motor vehicle body dimensions, which is reproduced through courtesy of the Commercial Vehicle, New York City, is a compilation of detail supplied by manufacturers and is extremely simple and comprehensive. It is a classification of the machines regarded as standard in the market and these are arranged in alphabetical order under divisions by capacity, giving, wherever possible, the length and width of bodies for which the chassis are adapted, or the proportions of stock bodies furnished. In some instances, where enclosed bodies are provided, the height of the equipment is stated. In addition, the chassis price and the prices of the stock bodies are given. In the manner presented this is a complete guide for the person desirous of making comparisons of vehicle and body data.

TRUCKS UNDER 1-TON CAPACITY

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Atterbury, A.....	1,500	.....	Optional.....	.....	3' 6"	Opt.	Opt.
Bauer, A.....	1,000	\$1,000	Open Ex.....	\$1,150	3' 7"	1' 6"	6'
Bauer, B.....	1,500	1,000	Open Ex.....	1,250	3' 7"	1' 6"	7'
Bauer, C.....	1,000	1,000	Inclosed.....	1,250	3' 7"	1' 6"	6'
Bauer, D.....	1,500	1,000	Inclosed.....	1,350	3' 7"	1' 6"	6'
Bessemer, C.....	1,000	1,250	Optional.....	.....	Opt.	Opt.	Opt.
Best, A.....	1,000	750	Open Ex.....	800	3' 6"	2' 7"	6'
Best, C.....	1,000	750	Panel.....	875	3' 6"	2' 7"	6'
Best, C.....	1,600	1,370	Open Ex.....	1,450	3' 9"	2' 9"	7' 3"
Best, C.....	1,600	1,370	Panel.....	1,550	3' 9"	2' 9"	7' 3"
Brown, 1/2 ton.....	1,500	1,650	Optional.....	.....	3' 8"	4' 8"	7' 6"
Buckeye, VI.....	800	900	Covered.....	950	3' 4"	4' 4"	5' 6"
Buckeye, VII.....	1,500	1,125	Optional.....	1,200	3' 8"	.....	6'
Buick, 3.....	1,000	1,000	Open Ex.....	1,100	3' 7"	Opt.	5' 2 1/2"
Buick, 3.....	1,000	1,000	Stake.....	1,150	3' 7"	Opt.	5' 2 1/2"
Buick, 3.....	1,000	1,000	Screen.....	1,200	3' 7"	Opt.	5' 2 1/2"
Buick, 3.....	1,000	1,000	Panel.....	1,250	3' 7"	Opt.	5' 2 1/2"
Buick, 4.....	1,500	1,125	Open Ex.....	1,250	3' 7"	Opt.	8' 2"
Buick, 4.....	1,500	1,125	Stake.....	1,300	3' 7"	Opt.	8' 2"
Buick, 4.....	1,500	1,125	Screen.....	1,350	3' 7"	Opt.	8' 2"
Butler, 1914.....	1,500	1,650	Express.....	1,775	4'	.....	8' 8"
Chase, 1,000-lb.....	1,000	855	Optional.....	900	3' 8 1/2"	10'	10'
Commerce, 1,000-lb.....	1,000	875	Panel.....	.....	3' 5"	4' 4"	5' 4"
Dart, 750-lb.....	750	.....	.....	800	.....	.....	.....
Dart, B.....	1,500	1,300	Express.....	1,300	3' 10"	1'	.....
Dispatch, 1914.....	1,200	825	Open.....	850	3' 4"	.....	6'
Dispatch, 1914.....	1,200	825	Panel.....	900	3' 4"	.....	6'
Dorris, 1/2-ton.....	1,500	2,100	Optional.....	.....	Opt.	Opt.	Opt.
Fargo, E.....	1,500	800	Express.....	900	3' 9"	.....	6' 6"
Gabriel, K.....	.....	1,000	Optional.....	.....	Opt.	Opt.	Opt.
Geneva, 2.....	1,100	1,250	Panel.....	1,350	3' 9"	4' 7"	4' 10"
Geneva, 2.....	1,200	1,250	Open Ex.....	1,300	3' 9"	.....	5' 3"
Hupmobile, 32.....	800	.....	Inclosed.....	1,075	3' 4"	4' 8"	4' 4"
International, MW.....	1,000	.....	Optional.....	.....	3' 6"	11'	6' 4"

TRUCKS UNDER 1-TON CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
International, MA.....	1,000	.....	Optional.....	.....	3' 6"	11'	6' 4"
Jeffery, 1514.....	1,500	.....	Optional.....	.....	Opt.	Opt.	Opt.
Kearns, A.....	1,500	\$850	Open Ex.....	\$1,175	3' 6"	1' 8"	6'
Kearns, A.....	1,500	850	Panel.....	1,200	3' 4"	5'	5'
Kisselkar.....	1,500	1,500	Express.....	1,625	3' 8"	.....	7'
Kosmath, 1914.....	1,000	850	Optional.....	900	3' 8"	Opt.	5' 7"
Krebs, 3.....	1,000	950	Optional.....	.....	3' 6"	4' 8"	5' 7"
Krebs, DB.....	1,500	1,425	Screen.....	1,600	3' 10"	4' 10"	6' 10"
Krebs, DB.....	1,500	1,425	Panel.....	.....	3' 10"	5'	6' 8"
Landshaft, C.....	1,500	1,000	Express.....	1,075	3' 7"	.....	7' 3"
Light, 800-lb.....	800	.....	.....	.....	3' 8"	2' 2"	1500
Lippard-Stewart, CI.....	500	1,650	Optional.....	.....	Opt.	Opt.	Opt.
Macarr, A.....	1,500	1,650	Express.....	1,825	3' 7"	5'	7'
Marmon, Del.....	1,500	2,500	Optional.....	.....	2' 10"	.....	4' 4"
Menominee, A-3.....	1,500	1,125	Express.....	200	3' 6"	.....	6' 6"
Menominee, A-3.....	1,500	1,125	Stake.....	200	5'	.....	7'
Mercury, P.....	1,000	.....	Open Ex.....	750	3' 2"	10'	6'
Mercury, P.....	1,000	.....	Canvas Pan.....	850	3' 2"	4' 6"	6'
Mercury, P.....	1,000	.....	Wood Pan.....	870	3' 2"	4' 6"	6'
Mercury, P.....	1,000	.....	Fore Door.....	900	3' 2"	4' 6"	6'
Miller, A.....	1,000	800	Optional.....	.....	3' 8"	4' 6"	5' 7"
Modern, F.....	1,500	1,500	Optional.....	.....	Opt.	Opt.	Opt.
Monitor, G.....	1,000	1,050	Express.....	1,050	3' 6"	.....	6' 8"
Moon, A.....	1,000	1,350	Optional.....	1,450	4'	.....	6'
Moreland, 1/2-ton.....	1,500	1,700	Optional.....	.....	Opt.	Opt.	Opt.
O. K., A.....	1,200	800	Optional.....	850	4' 8"	5' 10"	11' 8"
Overland, 79.....	800	.....	Express.....	900	3' 6"	.....	5' 1"
Overland, 79.....	800	.....	Panel.....	950	2' 8"	4' 4"	5' 4"
Palmer-Moore, C.....	1,600	1,350	Optional.....	.....	3' 8 1/2"	.....	6' 8"
Perfax, 18.....	1,000	875	Optional.....	.....	3' 6"	.....	5' 6"

TRUCKS UNDER 1-TON CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Rockford, 1-ton	1,500	\$1,500	Optional		Opt.	Opt.	Opt.
Service, J	1,500	1,350	Optional		Opt.	Opt.	Opt.
Sievert, H.	1,500	1,250	Optional	\$1,350	3' 8"	1' 5"	7'
Signal, 1-ton	1,500	1,350	Optional	1,450	3' 10"		8'
Signal, 1-ton	1,500	1,350	Open Pan.	1,525	3' 10"	4' 6"	8'
Signal, 1-ton	1,500	1,350	Inclosed Pan.	1,550	3' 10"	4' 6"	8'
Signal, 1-ton	1,500	1,350	Express	1,500	3' 10"	4' 6"	8'
Stegeman, 1-ton	1,500	1,600	Optional		Opt.	Opt.	8'
Stewart, 1-ton	1,500	1,500	Panel	1,650	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Top Ex.	1,625	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Open Ex.	1,625	3' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Screen	1,650	4' 8"	5'	7'
Stewart, 1-ton	1,500	1,500	Stake	1,625	4' 8"	5'	7'
Studebaker, Del	1,500	1,050	Panel	1,150	3' 5 1/2"		5' 11"
Studebaker, Del	1,500	1,050	Express	1,150	3' 7"		6' 1"
Tiffin, A.	1,200	1,600	Stake		5'		9' 6"
Tiffin, A.	1,200	1,600	Express		4' 8"	4'	9'
Tiffin, A.	1,200	1,600	Furniture		5'	4' 8"	9' 6"
Trabold, 1-ton	1,500	975	Express	1,075			8'
Wade, Del.	800	400	Optional	425	3'		8'
Wagenhals	800		Optional	690	3' 6"	2' 6"	5' 10"
White, GBBE.	1,500	2,100	Optional	2,250	3' 7"	5'	6' 10"
Willis-Utility, 65	1,500	1,350	Express	1,400	3' 10"	5'	8'
Willis-Utility, 65	1,500	1,350	Stake		3' 10"	3'	8'
Willis-Utility, 65	1,500	1,350	Screen		3' 10"	5'	8'
Willis-Utility, 65	1,500	1,350	Inclosed		3' 10"	5'	8'
Willis-Utility, 65	1,500	1,350	Flat Top		3' 10"	5'	8'
Willot, M.	1,500	1,650	Optional		3' 4"		7' 4"
Zimmerman							

TRUCKS OF 1 TO 2 TONS CAPACITY

Adams, A.	2,000	\$1,850	Flare Board	\$2,215	3' 10"	1' 2"	9'
Adams, A.	2,000	1,850	Flare Board	2,283	4' 6"	1' 4"	11'
Adams, A.	2,000	1,850	Stake	2,218	3' 10"	3' 4"	9'
Adams, A.	2,000	1,850	Stake	2,238	4' 6"	3' 4"	11'
Adams, D.	3,000	2,300	Flare Board	2,443	4' 2"	1' 2"	11'
Admiral, C.	3,000	1,475	Express	1,525	Opt.	2' 10"	9'
Admiral, C.	3,000	1,475	Stake	1,525	Opt.	2' 10"	9'
Anglaize, H.	2,000	950	Express	950	3' 4"	10"	8'
Anglaize, H.	2,000	1,350	Express	1,400	3' 6"	10"	8' 10"
Armleder, B.	2,000	2,200	Express	2,400	4' 2"	5' 10"	9'
Armleder, B.	2,000	2,200	Panel	2,550	4' 2"	5' 10"	8'
Armleder, B.	2,000	2,200	Express	2,375	4' 2"	5' 10"	9'
Atterbury, B.	2,000		Optional		4'		8'
Autocar, F.	3,000		Optional		4' 3"	2' 7"	9'
Available, 25.	2,000	1,350	Express	1,450	3' 8"	1' 2"	8' 6"
Available, 25.	2,000	1,350	Furniture	1,500	5'	2'	9' 6"
Available, 25.	2,000	1,350	Grocers	1,500	3' 8"	5'	8' 6"
Available, 25.	2,000	1,350	Panel Top	1,600	3' 8"	5'	8' 6"
Avery, 1-ton	2,000	1,690	Flare Board		4'		9'
Barker, U.	2,000	2,000	Optional	2,075	3' 8"		11'
Blair, 1 1/2-ton	3,000	2,850	Optional		5' 2"	Opt.	Opt.
Buckeye, V-4.	3,000	1,900	Optional	2,000	3' 10"		7' 10"
Chase, K.	2,000	1,330	Optional		3' 8 1/2"	1' 2"	6' 10"
Chase, H.	2,000	1,200	Optional	1,250	3' 8 1/2"	1' 2"	6' 10"
Chase, L.	3,000	1,675	Optional	1,750	4' 2 1/2"	1' 4"	7' 10"
Coleman, B.	2,000	1,950	Stake		4' 6"		8' 6"
Coleman, B.	2,000	1,950	Express		3' 10"		8' 6"
Continental	3,000	1,850					
Corbitt, F.	2,500	2,000	Stake	2,085	4'	3' 6"	11'
Corbitt, F.	2,500	2,000	Flat	2,065	4' 10"	3' 6"	11'
Corbitt, F.	2,500	2,000	Flare Board	2,075	4'	3' 6"	11'
Crown, B.	2,000	2,300	Optional		Opt.	Opt.	9'
Danielson, A.	3,000	2,000	Optional		Opt.	Opt.	11'
Dart, C.	3,000	1,775	Express		3' 10"	1' 2 1/2"	
Diamond, T. J.	3,000	2,250	Optional		Opt.	Opt.	Opt.
Federal		1,800					
Four Wheel Drive, G.	3,000	3,600	Optional		Opt.	Opt.	Opt.
Gabriel, H.		1,500	Optional		Opt.	Opt.	Opt.

TRUCKS OF 1 TO 2 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Gay, F.	2,000	\$1,475	Optional	\$1,575	3' 10"		8'
Gay, G.	3,000	1,675	Optional	1,775	4'		9'
G. M. C., VC.	2,500	1,900	Flare Board	2,062	4' 6"	1' 10"	10'
G. M. C., VC.	2,500	1,900	Screen	2,145	4' 6"	5'	10'
G. M. C., VC.	2,500	1,900	Stake	2,040	4' 6"	3' 4"	10'
G. M. C., VC.	2,500	1,900	Furniture	2,110	4' 2"	5'	12'
G. A. Gramms, 1-ton	2,000	1,750	Optional		Opt.	Opt.	Opt.
Harvey, D.	3,000	1,875	Furniture	2,000	3' 10"	1' 6"	10'
Harvey, D.	3,000	1,875	Stake	2,000	3'		10'
Hornor, 1-ton	2,000	2,000	Optional		Opt.	Opt.	Opt.
Hornor	3,000	2,250	Optional		Opt.	Opt.	Opt.
Ideal, I.	2,000	1,500	Optional		3' 8"	3' 3"	8' 6"
Ideal, H-2	3,000	2,000	Optional		4' 6"	3' 4"	10'
Jeffery, 2014	2,000						
Kalamazoo, B.	3,000	1,590	Stake		5'		9'
Kalamazoo, B.	3,000	1,590	Express		4' 1"		8' 9"
Kelly, K-30	2,000	2,000	Optional		Opt.	Opt.	Opt.
Kisselkar, 1-ton	2,000	1,850	Stake	1,975	3' 4"		9'
Kisselkar, 1 1/2-ton	3,000	2,100	Stake	2,250	5' 5"		8'
Koehler, 1-ton	2,000	725	Open Flare	750	4'	1' 5"	7'
Koehler, 1-ton	2,000	725	Express	790	4'	4' 7"	7'
Koehler, 1-ton	2,000	725	Canvas Side	800	3' 8"	4' 5"	7'
Koehler, 1-ton	2,000	725	Panel	900	3' 6"	4' 5"	7'
Koehler, 1-ton	2,000	725	Stake	750	3' 8"		7'
Koehler, 1-ton	2,000	725	Plumber	800	3' 8"	1'	8'
Koehler, 1-ton	2,000	725	Baker	925	4'	4' 8"	8'
Koehler, 1-ton	2,000	725	Furniture	825	4' 2"	1' 5"	9'
Krebs, AA	2,000	1,425	Flare Board	1,560	3' 9"		6' 10"
Krebs, DD	3,000	1,775	Optional		3' 10"		8' 8"
Krebs, DD	3,000	1,775	Flare Board		4' 2"		9' 8"
Krebs, DD	3,000	1,775	Stake		5' 6"		11'
Landshaft, J.	3,000	1,800	Express	1,900	4' 4"		10'
Lange, C.	2,000	2,250	Optional		Opt.	Opt.	Opt.
Lauth-Juergens, K.	2,000	2,100					
Lippard-Stewart, F.	3,000	2,300					
Little Giant, F.	2,000	1,200	Flare Board	1,275	3' 8"	1' 1"	9' 6"
Little Giant, F.	2,000	1,200	Canvas Top	1,325	3' 8"	4' 9"	9' 6"
Little Giant, F.	2,000	1,200	Stake	1,300	3' 8"	2' 6"	9' 6"
Little Giant, F.	2,000	1,200	Panel	1,375			
Little Giant, H.	2,000	1,350	Flare Board	1,425	3' 8"	1' 1"	9' 6"
Little Giant, H.	2,000	1,350	Canvas Top	1,475	3' 8"	4' 9"	9' 6"
Little Giant, H.	2,000	1,350	Stake	1,450	3' 8"	2' 6"	9' 6"
Little Giant, H.	2,000	1,350	Panel	1,525			
Lord Baltimore, B.	2,000	1,800	Screen	2,000	3' 10"	6'	9'
Maccarr, B.	2,000	1,900	Express	2,100	3' 10"	5' 6"	8' 6"
Maccarr, C.	3,000	2,150	Express	2,250	3' 10"	5' 6"	9' 6"
Mack, 1-ton	2,000	2,000	Optional		Opt.	Opt.	Opt.
Mais, C.	3,000	2,750	Optional		5'		8' 3"
Mais, D.	3,000	2,800	Optional		5'		10' 6"
Martin, S.	3,000						
Menominee, B-3	2,000	1,400	Express	1,500	3' 10"		8' 6"
Menominee, B-3	2,000	1,400	Stake	1,500	5'		8' 6"
Menominee, C.	3,000	1,800	Optional	1,950			10'
Modern, G.	2,000	1,700					
Modern, H.	3,000	1,950					
Monitor, D.	2,000	1,650	Optional	1,750	4'		8'
Moon, B.	3,000	1,800	Open Ex.	1,900	3' 10"		8' 6"
Moon, B.	3,000	1,800	Stake	1,950	3' 10"		8' 6"
Moon, B.	3,000	1,800	Inclosed	1,950	3' 10"		7' 8"
Moon, B.	3,000	1,800	Furniture	2,150	5'		9'
Moon, B.	3,000	1,800	Top Stake	2,050	5'		8' 5"
Moore, 1 1/2-ton	3,000	1,950	Optional		Opt.	Opt.	9' 6"
Mora, 24	2,000	1,400	Open Ex.	1,515	3' 9"		7' 6"
Nateo, 15	2,000	1,925	Optional		Opt.	Opt.	Opt.
Nelson-LeMoon, D-1	2,000	1,800	Optional		Opt.	Opt.	Opt.
New York		2,000	Optional		Opt.	Opt.	Opt.
O. K., A.	2,000	800	Stake	1,520	5'		10'
Palmer-Meyer, 1-ton	2,000	1,600	Optional		4' 2"		6' 2"
Palmer-Meyer, 1 1/2-ton	3,000	1,975	Optional		4' 2"		
Pathfinder, 1-ton	2,000		Stake		5' 4"		5' 11"
Pathfinder, 1-ton	2,000		Inclosed		3' 8"	4' 3"	6' 8"
Progress, A.	3,000		Brewery	2,900	5'	3'	10'
Progress, A.	3,000		Express	2,850	5'	1'	10'
Progress, A.	3,000		Platform	2,800	5'	4'	10'

TRUCKS OF 1 TO 2 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Sanford, K.	2,000	\$1,660	Optional	\$1,750	Opt.	Opt.	Opt.
Sanford, L.	3,000	1,910	Optional	2,060	Opt.	Opt.	Opt.
Selden, J.	2,000	2,000					
Service, Q.	3,000	1,800	Optional		Opt.	Opt.	Opt.
Service, K.	2,000	1,475	Optional		Opt.	Opt.	Opt.
Service, M.	3,000	1,675	Optional		Opt.	Opt.	Opt.
Star, B.	2,000	1,500	Optional	1,600	5'	2'10"	7'
Star, A.	3,000	1,800	Optional	1,950	5'	3'	10' 8"
Stegeman, 1-ton	2,000	2,250	Optional		Opt.	Opt.	Opt.
Sullivan, 51.	2,000	1,050	Express	1,140	3'10"	2'10"	7' 6"
Sullivan, 51.	2,000	1,050	Stake	1,140	4'	2'10"	7' 6"
Tiffin, G.	2,000	2,000	Stake		5' 6"		10'
Tiffin, G.	2,000	2,000	Express		4' 8"	4'	9'
Tiffin, G.	2,000	2,000	Furniture		5' 6"	5'	10'
Tiffin, G.	2,000	2,000	Coal		4'		9'
Tiffin, G.	2,000	2,000	Brewers' Case		5' 6"		10'
Trabold, C.	2,000	1,475	Express	1,575	3'11"	3' 2"	9'
Trabold, 1½-ton	3,000	1,900	Express	1,900	3' 2"	9' 6"	
Universal, T.	3,000	1,950	Stake	2,000	5' 2"	3' 4"	10'
Universal, C.	3,000	1,950	Express	2,050	3' 8"	2'10"	10'
Veerac, B.	2,000	1,100	Express	1,150	3' 6"	9' 6"	7' 4"
Veerac, B.	2,000	1,100	Stake	1,175	4'11"	7' 4"	
Veerac, B.	2,000	1,100	Inclosed	1,250	3' 6"	4' 4"	7' 4"
White, TBC	3,000	3,000	Platform	3,150			
White, TBC	3,000	3,000	Express	3,150	4' 4"	5' 6"	9' 2"
Wichita, A.	2,000	1,650	Stake	1,775	5'		8' 6"
Wilcox, L.	2,000						

TRUCKS OF 2 TO 3 TONS CAPACITY

Adams, E.	4,000	\$2,500	Flare Board	\$2,690	5'	1' 2"	11'
Adams, E.	4,000	2,500	Platform	2,643	5'	2' 6"	11'
Armleder, H.	4,000	2,150	Express	2,350	4' 2"	5'10"	11'
Armleder, H.	4,000	2,150	Panel	2,450	4' 2"	5'10"	9'10"
Armleder, H.	4,000	2,150	Stake	2,325	4' 2"	5'10"	9'11"
Armleder, H.	4,000	2,150	Furniture	2,450	5' 6"	6' 6"	11'
Armleder, E.	5,000	2,500	Express	2,750	4' 2"	5'10"	11'
Armleder, E.	5,000	2,500	Ice	2,750	4'	4'	9'
Armleder, E.	5,000	2,500	Bottle Beer	2,800	4' 2"	6'	9'
Armleder, E.	5,000	2,500	Furniture	2,850	5' 6"	6' 6"	11'
Armleder, E.	5,000	2,500	Coal	2,800	4' 4"	2'	9'
Armleder, E.	5,000	2,500	Brewery	2,800	4' 4"	3' 6"	10'
Atterbury, C.	4,000		Optional		5'	Opt.	10'
Avery, B.	4,000	2,700	Optional		Opt.	Opt.	Opt.
Bessemer, B.	4,000	1,800	Optional		Opt.	Opt.	Opt.
Blair, D.	5,000	3,250	Optional		Opt.	Opt.	Opt.
Buckeye, V-5.	4,000	2,200	Optional	2,300	3'10"		7'10"
Chase, J.	4,000	2,100	Optional	2,200	4' 6"	1' 4"	9'10"
Coleman, C.	4,000	2,400	Stake		5' 6"		10' 6"
Coleman, C.	4,000	2,400	Express		4'		10' 6"
Crown, C.	4,000	3,000	Optional		Opt.	Opt.	11'
De Kalb, D-2.	4,000	2,600	Platform		5'	Opt.	Opt.
De Kalb, D-2.	4,000	2,600	Express		5'	Opt.	Opt.
Dorris, 2-ton	4,000	2,500	Optional		Opt.	Opt.	Opt.
Gabriel, L.	2,500	Optional			Opt.	Opt.	Opt.
Garford, L.	4,000	2,800	Optional		Opt.	Opt.	Opt.
G. M. C., SC.	4,000	2,600	Flare Board	2,770	5'	2' 1"	10'
G. M. C., SC.	4,000	2,600	Screen	2,855	5'	5'	10'
G. M. C., SC.	4,000	2,600	Stake	2,747	5'	3' 4"	10'
G. M. C., SC.	4,000	2,600	Furniture	2,825	5' 6"	5'	11'
B. A. Gramm, 2-ton	4,000	2,750	Optional		Opt.	Opt.	Opt.
Horner, 2-ton	4,000	2,650	Optional		Opt.	Opt.	Opt.
Ideal, K.	5,000	2,500	Optional		5'	3' 5"	12'
Kisselkar, 2½-ton	5,000	2,750	Stake	2,900	5'11"		10'
Knox, R-3.	4,000	3,000	Optional		Opt.	Opt.	Opt.
Lange, B.	4,000	3,000	Optional		4' 6"	Opt.	10' 6"
Lauth-Juergens, L.	4,000	2,800	Optional		Opt.	Opt.	Opt.
Lewis, 21.	5,000	3,500	Optional		Opt.	Opt.	Opt.
Lord Baltimore, D.	4,000	2,300	Screen	2,500	5'	6'	10'

TRUCKS OF 2 TO 3 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Mais, E.	4,000	\$2,950	Optional		5'		10' 6"
Mais, F.	4,000	3,000	Optional		5'		12' 3"
Mais, G.	5,000	3,400	Optional				
Martin, E.	5,000		Optional		Opt.	Opt.	Opt.
Mogul, L.	4,000	2,360	Express		4'		11'
Mogul, L.	4,000	2,360	Stake		4'		11'
Mogul, L.	4,000	2,360	Furniture		5'		14'
Mogul, G.	4,000	2,750	Optional		5'		11'
Moore, 2-ton	4,000	2,500	Optional		Opt.	Opt.	11' 6"
Moreland, 2-ton	4,000	2,350	Optional		Opt.	Opt.	Opt.
Nelson-LeMoon, D-2.	4,000	2,250	Optional		Opt.	Opt.	Opt.
Packard, 2-ton	4,000	2,800	Optional		Opt.	Opt.	Opt.
Pierce-Arrow, X-2.	4,000	3,000	Optional		Opt.	Opt.	Opt.
Reo, J.	4,000	1,650	Optional	\$1,800	5' 6"		9'10"
Rockford, 2-ton	4,000	2,500	Optional		Opt.	Opt.	Opt.
Schacht, 2-ton	4,000	2,650	Optional		Opt.	Opt.	11'
Service, P.	4,000	2,375	Optional		Opt.	Opt.	Opt.
Speedwell, Y.	4,000	2,850	Box		2,950	6'	1' 10' 6"
Speedwell, Y.	4,000	2,850	Stake		2,950	6'	4' 10' 6"
Stegeman, 2-ton	4,000	2,950	Optional		Opt.	Opt.	Opt.
Sternberg, 2-ton	4,000	2,800	Optional		Opt.	Opt.	Opt.
Sternberg, 2-ton	5,000	3,250	Optional		2'10"	3'10"	10'4½"
Tiffin, M.	4,000	2,600	Stake		6'		11' 2"
Tiffin, M.	4,000	2,600	Express		5'	4' 6"	10' 6"
Tiffin, M.	4,000	2,600	Furniture		6'	5'	12'
Tiffin, M.	4,000	2,600	Coal		4' 2"		10'
Tiffin, M.	4,000	2,600	Brewery		6'		11' 2"
Trebold, 2-ton	4,000	2,450	Express		2,550	5' 6"	3' 2" 12"
Transit, F.	4,000	2,850	Optional		Opt.	Opt.	14'
Twin City, 2-ton	4,000	1,350	Optional		4'		10'
U. S., E.	4,000	2,800	Optional		Opt.	Opt.	10'
Velie, Y.	4,000	2,850	Optional		3,000	5'	Opt. Opt.
Vulcan, 2-ton	4,000	2,750	Optional		Opt.	Opt.	Opt.
Ware, A.		3,000	Optional		Opt.	Opt.	Opt.
Wichita, B.	4,000	2,100	Stake		2,250	5'10"	3' 3"
Wilcox, N.	4,000		Optional		Opt.	Opt.	Opt.

TRUCKS OF 3 TO 4 TONS CAPACITY

Atterbury, B.	6,000		Optional		6'		12'
Avery, B.	6,000	\$3,200	Standard		6' 4"		12' 8"
Avery, A.	6,000	3,200	Farm		4' 4"		10' 4"
Bessemer, A.	6,000	2,100	Optional		Opt.	Opt.	Opt.
Blair, E.	7,000	3,750	Optional		Opt.	Opt.	Opt.
Diamond, T. G.	6,000	3,350	Optional		Opt.	Opt.	14'
Four Wheel Drive, B.	6,000	4,000	Stake	\$4,150	5'	3'	11'
Four Wheel Drive, B.	6,000	4,000	Optional		Opt.	Opt.	Opt.
Garford, J.	6,000	3,500	Optional		Opt.	Opt.	Opt.
G. M. C., H.	7,000	3,250	Flare Board	3,565	5' 6"	5' 6"	14'
G. M. C., H.	7,000	3,250	Brewery	3,497	5' 6"	6'	14'
G. M. C., H.	7,000	3,250	Furniture	3,520	6'	6'	14'
G. M. C., HU.	7,000	3,500	Flare Board	3,795	5' 6"	5' 6"	12'
G. M. C., HU.	7,000	3,500	Brewery	3,732	5' 6"	6'	12'
G. M. C., HU.	7,000	3,500	Furniture	3,755	6'	6'	13'
B. A. Gramm, 3½-ton	7,000	3,600	Optional		Opt.	Opt.	Opt.
Horner, 3-ton	6,000	3,200	Optional		Opt.	Opt.	Opt.
Kelly, K-40.	6,000	3,400	Optional		Opt.	Opt.	Opt.
King, 3.	7,000	3,350	Optional		Opt.	Opt.	13'
Kisselkar, 3½-ton	7,000	3,350	Stake	3,500	6'		13'
Knickerbocker, 3.	6,000	3,750	Optional		Opt.	Opt.	Opt.
Lauth-Juergens, M6.	6,000	3,450	Optional		Opt.	Opt.	Opt.
Lewis, 21S.	6,000	3,250	Optional		Opt.	Opt.	Opt.
Mais, H.	6,000	3,400	Optional		5'		14'
Martin, L.	7,000		Optional		Opt.	Opt.	Opt.

TRUCKS OF 3 TO 4 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Moore, 3-ton	6,000	\$3,150	Optional	.....	Opt.	Opt.	Opt.
Nelson-LaMoon, D-3	6,000	2,750	Optional	.....	Opt.	Opt.	Opt.
Nevada, H	6,000	3,500	Optional	.....	Opt.	Opt.	Opt.
Packard, 3-ton	6,000	3,400	Optional	.....	Opt.	Opt.	Opt.
Progress, O	6,000	3,500	Brewery	\$3,700	6'	3' 6"	12'
Progress, O	6,000	3,500	Trunk	3,600	6'	12'	
Progress, O	6,000	3,500	Package	3,700	6'	3' 6"	12'
Progress, O	6,000	3,500	Bottle	3,800	5' 9"		14' 3"
Peerless, 3-ton	6,000	3,700	Platform	.....	6'	Opt.	Opt.
Pope-Hartford, 3-ton	6,000	3,350	Platform	3,550	6' 6"	Opt.	14'
Service, H	6,000	2,975	Optional	.....	Opt.	Opt.	Opt.
Standard, 3-ton	6,000	2,750	Exp. & Stake	3,050	Opt.	Opt.	12' 3"
Standard, 3-ton	6,000	2,750	Dump	3,350	Opt.	Opt.	10'
Standard, 3-ton	6,000	2,750	Van	3,500	Opt.	Opt.	18'
Stegman, 3-ton	6,000	3,500	Optional	.....	Opt.	Opt.	12'
Sternberg, 1914	6,000	3,400	Optional	.....	Opt.	Opt.	Opt.
Transit, T	7,000	3,500	Optional	.....	Opt.	Opt.	14'
Universal, A	5,000	3,400	Stake	3,550	6'	3' 8"	Opt.
U. S. D	6,000	3,500	Optional	.....	Opt.	Opt.	12'
Valla, C	6,000	3,350	Standard	3,500	6'	Opt.	Opt.
Vulcan, 3-ton	6,000	3,250	Optional	.....	Opt.	Opt.	Opt.
White, GTA	6,000	3,700	Standard	3,850	6' 5"		13'
White, H	7,000	3,250	Stake	3,450	7'	3' 8"	13'
White, JA	6,000						
White, L	6,000	2,800	Optional	.....	6'	Opt.	Opt.

TRUCKS OF 4 TO 5 TONS CAPACITY

Garford, 4	8,000	\$3,850	Optional	.....	Opt.	Opt.	Opt.
International, 4	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
LaFrance, 4	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
LaFrance, 4	8,000	2,750	Stake	\$3,000	6'		12'
LaFrance, 4	8,000	3,800	Optional	.....	Opt.	Opt.	11' 6"
LaFrance, 4	8,000	3,900	Optional	.....	Opt.	Opt.	Opt.
LaFrance, 4	8,000	3,550	Optional	.....	Opt.	Opt.	Opt.
LaFrance, 4	8,000	4,000	Platform	.....	6'	Opt.	Opt.
LaFrance, 4	8,000	3,750	Box	3,850	6' 6"	1'	12' 6"
LaFrance, 4	8,000	3,750	Stake	3,850	6' 6"	4'	12' 6"
LaFrance, 4	8,000	2,750	Exp.	3,050	Opt.	Opt.	18'
LaFrance, 4	8,000	2,750	Tank	3,300	Opt.	Opt.	18'
LaFrance, 4	8,000	3,950	Optional	.....	Opt.	Opt.	Opt.
LaFrance, 4	8,000		Optional	.....	Opt.	Opt.	Opt.
Vulcan, 4-ton	8,000	4,000	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 4-ton	9,000	4,250	Optional	.....	Opt.	Opt.	Opt.

TRUCKS OF 5 TONS CAPACITY

LaFrance, 5	10,000		Optional	.....	6'		14'
A. E. & S.	10,000	\$3,500	Optional	.....	6'		12' 6"
Armstrong, 5	10,000	4,500	Stake	.....	6' 4"	3'	14'
Chrysler, T-5	10,000	3,600	Optional	.....	Opt.	Opt.	14'
Garford, 5	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
G. M. & S.	10,000	4,500	Flare Board	\$4,815	6'	6'	13'
G. M. & S.	10,000	4,500	Brewery	4,745	6'	6'	13'
G. M. & S.	10,000	4,500	Furniture	4,770	6'	8'	14'
G. M. & S.	10,000	4,500	Dump	5,100	3' 10"	2' 3"	12'
G. M. & S.	10,000	4,500	Lumber	4,750	4' 5 1/2"	4'	18'
G. M. & S.	10,000	4,250	Flare Board	4,575	6'	6'	14'
G. M. & S.	10,000	4,250	Brewery	4,502	6'	6'	14'
G. M. & S.	10,000	4,250	Furniture	4,520	6'	6'	14'
G. M. & S.	10,000	4,250	Dump	4,850	3' 10"	2' 3"	12'
S. A. Green, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Ward, 5-ton	10,000	4,200	Optional	.....	Opt.	Opt.	Opt.
White, 5-ton	10,000	4,800	Optional	.....	Opt.	Opt.	Opt.

TRUCKS OF 5 TONS CAPACITY—Continued

NAME AND MODEL	Capacity, Pounds	Chassis Price	Body Style	Price with Body	LOAD SPACE		
					Width	Height	Length
Lewis, 51	10,000	\$4,750	Optional	.....	Opt.	Opt.	Opt.
Locomobile, A	10,000	4,800	Optional	.....	Opt.	Opt.	Opt.
Mack, 5-ton	10,000	4,000	Optional	.....	Opt.	Opt.	Opt.
Moore, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Moreland, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Packard, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Peerless, 5-ton	10,000	4,500	Platform	.....	6'		Opt.
Peerless, 5-ton	10,000	4,500	Hoist	.....	4'	2' 3"	12'
Pierce-Arrow, R-5	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Pope-Hartford, 5-ton	10,000	4,350	Stake	\$4,550	6' 6"	Opt.	14'
Pope-Hartford, 5-ton	10,000	4,350	Optional	.....	Opt.	Opt.	Opt.
Royal, A-5	10,000	4,500	Optional	.....	Opt.	Opt.	13'
Sears, 5-ton	10,000	3,800	Platform	3,950	6'	5'	Opt.
Sears, 5-ton	10,000	3,900	Platform	4,050	6'	5'	Opt.
Sternberg, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
Transit, V	10,000	4,500	Express	4,700	6'	Opt.	14'
Vulcan, 5-ton	10,000	4,500	Optional	.....	Opt.	Opt.	Opt.
White, TC	10,000	4,500	Standard	4,700	6' 5"		12'

TRUCKS OF OVER 5 TONS CAPACITY

Couple Gear, AC	12,000	\$5,800	Stake	\$5,800	6' 6"	7'	14'
Couple Gear, AC	12,000	5,600	Canvas Top	6,000	6' 6"	7'	14'
Couple Gear, AC	12,000	5,600	Panel	6,100	6' 6"	7'	14'
Couple Gear, AC	12,000	5,600	Dump	6,100	4' 6"		11'
Couple Gear, ACT		5,550	Tractor		Opt.	Opt.	Opt.
Garford, F	12,000	4,850	Optional	.....	Opt.	Opt.	Opt.
G. V. F V	12,000		Optional	.....	Opt.	Opt.	Opt.
Kisselkar, 6-ton	12,000	4,350	Stake	4,500	6'		14'
Knox, Tractor		3,250					
Knox, Tractor	40,000	3,750					
Knox, M-3		4,100	Sing Tank	5,800			
Knox, M-3		4,100	Doub Tank	5,900			
La France, 6-ton	12,000	5,500	Stake	.....	Opt.	Opt.	Opt.
Mogul, M	12,000	4,700	Optional	.....	Opt.	Opt.	Opt.
Mogul, U	12,000	4,750	Lumber	.....	6'	6'	15' 10"
Packard, 6-ton	12,000	4,650	Optional	.....	Opt.	Opt.	Opt.
Peerless, 6-ton	12,000		Platform	.....	6'		Opt.
Saurer, 6-ton	13,000	5,800	Optional	.....	Opt.	Opt.	Opt.
Speedwell, X	12,000	4,400	Box	4,500	6' 9"	1'	15' 6"
Speedwell, X	12,000	4,400	Stake	4,500	6' 9"	4'	15' 6"
Sternberg, 6-ton	12,000	4,750	Optional	.....	Opt.	Opt.	Opt.
Sternberg, 7-ton	14,000	5,000	Optional	.....	Opt.	Opt.	Opt.
Vulcan, 7-ton	14,000	6,000	Optional	.....	Opt.	Opt.	Opt.

PUBLIC SERVICE VEHICLES

Armleder, B		\$2,200	Bus	\$2,750	12 Passengers
Armleder, B		2,200	Patrol	3,200	
Armleder, H		2,150	Bus	2,750	16 Passengers
Croston, T		1,860	Taxicab	2,500	
Great Eagle, A			Ambulance		
Great Eagle, A			Hearse		
Great Eagle, D			Ambulance	3,500	to \$6,000
Great Eagle, D			Hearse	3,500	to \$6,000
Koehler, 1-ton	2,000	725	Bus	1,000	12 Passengers
Koehler, 1-ton	2,000	725	Hose Wagon	1,650	
Little Giant, F		1,200	Bus	1,900	12 Passengers
Little Giant, H		1,350	Bus	2,050	12 Passengers
Martin, B	3,000		Fire Wagon	5,000	
Martin, A	4,000		Fire Wagon	5,000	
Meen, B		1,800	Bus	3,200	
S. & S., A	1,500	2,000	Ambulance	3,250	
S. & S., A	1,500	2,000	Hearse	3,500	
Stewart	1,500	1,500	Undertaker	2,100	
White, TBC	3,000	3,000	Bus		
White, TBC	3,000	3,000	Fire Wagon		
White, GBSE	1,500	2,100	Patrol		
White, GBSE	1,500	2,100	Ambulance		
White, GBSE	1,500	2,100	Hearse		
Willys-Utility, 65	1,500	1,350	Bus		

SPECIFICATIONS OF 1914 ELECTRIC TRUCKS.

THE following tabulation gives the principal specifications of the different models or types produced by 17 of the leading manufacturers of electric service vehicles. The table includes 63 different sizes of machines, ranging in capacity from 500 to 12,000 pounds, and each different make is given in the order

of sizes. The information is presented as complete as is practicable, for with the majority of the manufacturers there are different options given.

These options apply particularly to battery equipment, although many of the builders regularly supply a single make, unless otherwise specified.

Name	Rated Loads, Lbs.	Model or Type...	Wheelbase, In....	Make of Motor...	Make	Battery		Speed, MPH....	Maximum Forward Speed Ratios....	Rear Axle Type.. Final Drive.....	Tire Size, Front..	Tire Size, Rear...	Body Dimensions			Chassis Weight, In Lbs.	Price Chassis Only.....
						Ampere Hours..	Miles a Charge.						Length.....	Width	Height		
Anderson	1,000	1	100		Op.	150	50	14	4	S F	32-3	34-3	72	48		2600	\$1800
Anderson	2,000	2	100		Op.	225	50	12	4	S F	32-3.5	34-3.5	96	48		3850	2050
Anderson	4,000	4	128		Op.	300	50	10	4	C D	36-4	36-3.5	132	60		6300	2800
Anderson	7,000	7	144		Op.	375	45	8	4	C D	36-5	36-5D	156	60		8000	3850
Anderson	10,000	10	144		Op.	450	40	7	4	C D	36-6	36-5D	156	60		9300	4200
Argo	1,000	K-10	86		El.	50	16	5	S F	S F	34-3	34-3				2700	1750
Argo	2,000	K-20	96		El.	50	13	5	S F	S F	34-3.5	34-3.5	68	42		3000	2000
Argo	1,000	L-10	86		El.	50	15	5	S F	S F	34-3	34-3				2700	1850
Atlantic	1,000	10-C	102	GE	Op.		16	4			36-3	36-3	78	42		2700	
Atlantic	2,000	1-C	103	GE	Op.		12	4	C D		34-3.5	36-4	102	60		2770	
Atlantic	4,000	2-C	114	GE	Op.		10	4	C D		34-4	36-3D	126	60		3590	
Atlantic	7,000	3-C	135	GE	Op.		8	4	C D		36-5	40-4D	144	72		5220	
Atlantic	10,000	5-C	144	GE	Op.		7	4	C D		36-6	40-5D	156	72		6230	
Baker	1,000	X	86	GE	El.	112	45	15	5	C D	36-3	36-3				3243	1900
Baker	2,000	O	102	GE	El.	140	40	13	5	C D	36-3.5	36-3.5				4495	2300
Baker	4,000	U	120	GE	El.	168	40	10	5	C D	36-4	36-3D				5842	2800
Baker	7,000	CC	137	GE	El.	224	40	9	5	C D	36-6	38-4D				8634	3500
Borland-Grannis	1,500		96		Go.		50	15	5	C D	32-4	32-4	74	45		2100	
Buffalo	1,500		102	GE	Ph.	135	50	12	5	S F	36-3.5	36-3.5				2200	
Buffalo	2,000		102	GE	Ph.	165	45	12	5	S F	36-3.5	36-3.5				2400	
Capitol	1,000		108		Go.	60	12	4	W F							1800	1800
Capitol	2,000		114		Go.	50	12	5	W F							2500	2250
Capitol	4,000		130		Go.	50	12	4	W F							5000	3000
Commercial Truck..	500	A	85	GE			15	4	W F		36-2.5	36-2.5				1500	1440
Commercial Truck..	1,000	B	90	GE			15	3	W F		36-2.5	36-3				1750	1640
Commercial Truck..	2,000	C	100	GE			12	4	I D		36-3.5	36-4				2300	2095
Commercial Truck..	4,000	D	116	GE			10	4	I D		36-5	36-3.5D				3100	2725
Commercial Truck..	7,000	E	115	GE			9	4	I D		36-3.5D	36-4D				5000	3530
Commercial Truck..	10,000	F	132	GE			7	4	I D		36-6	40-5D				6000	9535
Couple-Gear	7,000	H-8	102		US.	250	45	8	5	I D	36-4D	36-4D				9000	4250
Couple-Gear	10,000	A-9	104		US.	280	35	8	5	I D	36-5D	36-5D				10,000	4850
Fritchle	1,000		88			100	14	5	S F		34-4	34-4				2000	1900
GMC	1,000	1	106		Op.		13	5	C D		32-2.5	32-3.5				2540	1200
GMC	2,000	2	106		Op.		11	5	C D		32-2.5	32-3.5				2780	1300
GMC	3,000	3	130		Op.		10	5	C D		32-3					3040	1450
GMC	4,000	4	138		Op.		9	5	C D		32-3	32-5				4005	1650
GMC	6,000	6	150		Op.		8	5	C D		32-3.5	36-3.5				4765	1900
GMC	8,000	8	156		Op.		7	5	C D		32-4	36-4				5620	2100
GMC	10,000	10	166		Op.		7	5	C D		36-5	36-5				6225	2350
GMC	12,000	12	192		Op.		6	5	C D		36-6	36-6				6820	2500
General Vehicle.....	750		76	GE		45	12	4	C D		32-2.5	32-2.5	58	40	53	2500	1370
General Vehicle.....	1,000		87	GE		45	12	4	C D		36-2.5	36-2.6	72	41	60	1750	1640
General Vehicle.....	1,000			GE		45	15	4	W F								
General Vehicle.....	2,000		102	GE		45	10	4	C D		36-3.5	36-3.5	96	48	66	4105	2100
General Vehicle.....	4,000		112	GE		45	9	4	C D		36-4	36-3D	137	56	72	5755	2600
General Vehicle.....	7,000		128	GE		40	8	4	C D		36-6	36-3.5D	154	60	72	7655	3250
General Vehicle.....	10,000		139	GE		35	7	4	C D		36-7	36-5D	180	72	72	8615	3700
Heubner	500	6	72			35	10	3	D		20-1	28-2	48	46	42	800	500
Urban	1,000	10	86		El.	50	12	4	C D		36-3	36-3	72	42		3220	
Urban	2,000	20	109		El.	45	10	4	C D		36-3.5	36-5	103	48		5048	
Urban	4,000	40	116		El.	45	9	4	C D		36-4	36-4D	132	68		5668	
Urban	7,000	70	130		El.	40	8	4	C D		36-5	40-6D	148	80		8612	
Van Auken.....	750	A	80		El.	40	12	4	S D		28-2	28-2	56	41	53	1380	1000
Ward	750	EO	80		Op.	60	14	4	C D		30-2.5	32-3				1800	1050
Ward	1,250	EA	84		Op.	50	12	4	C D		32-3	34-3.5				2100	1450
Ward	2,500	EB	96		Op.	45	10	4	C D		34-3.5	36-5				2900	1900
Ward	5,000	EC	114		Op.	40	8	4	C D		38-5	38-3.5D				4600	2400
Ward	10,000	ED			Op.	35	6	4	C D		38-3.5D	40-5D				6700	2950
Waverley	1,000		90		Op.	50	14	4	S F		34-2.5	34-2.5	73	43	56	3250	1325
Waverley	2,000		101		Op.	45	11	4	C D		34-3.5	34-3.5	102	44	60	4570	1850
Waverley	4,000		114		Op.		9	4	C D		36-4	36-3D	132	54	72	6370	
Waverley	7,000		127		Op.	30	7	4	C D		36-6	36-3.5D	144	60	72	8130	
Waverley	10,000		136		Op.		6	4	C D		36-7	36-5D	156	78	72	9575	3450

Motor—GE, General Electric. Batteries—Op., Optional; Ph., Philadelphia; Go., Gould; US., United States; El., Electric Storage Battery; Ed., Edison Storage Battery Company. Drive—C, chain; W, worm shaft and gear; S, shaft and bevel gear; I, internal gear. Rear Axle—F, floating or live; D, dead. Tires—D, following figures indicates dual equipment.

PALMER-MOORE EXHIBIT.

During the automobile show at Syracuse, N. Y., Feb. 23-28, one of the features was an exhibition made by the Palmer-Moore Company of motor delivery wagons driven by both air and water-cooled, two-cycle engines. The company displayed a chassis with air-cooled engine and planetary transmission gearset fitted with a four-post body, a chassis with a water-cooled engine and sliding gear transmission gearset with an express body, and a chassis of the second type named for demonstration in the show, and in the street demonstration chassis with water and air-cooled motors and sliding transmission gearsets, the former with a four-post express body and the latter with an open express body, were used.

The company now utilizes practically all of the four-acre plant of the Syracuse Stove Works in North Geddes street, which was purchased for manufacturing purposes, and where its executive offices are now located. This factory is stated to be one of the best equipped in the country for the manufacture of light delivery wagons, and the company is now prepared to meet practically any demand that may be made upon it for its products. The purpose is to build machines that will be suited for every requirement for light delivery.

WANT MOTOR 'BUS FRANCHISES.

Three different concerns, or representatives of prospective organizations, are seeking franchise to operate motor omnibus public lines in Chicago. One of these is the Chicago Automobile Transportation Company, which is promoted by Edward F. Dunne, Jr., who is said to represent Richard W. Meade of the Fifth Avenue Coach Company of New York City, R. A. Madelik of the General Omnibus Company of London, and James M. Carples of New York. Another is the Chicago Motorbus Company, which is said to be the project of R. R. and S. L. Conklin of New York City, and the other is composed of Chicago men who believe there will be a satisfactory profit from the venture.

The Detroit Battery Company has been organized at Detroit, Mich., for the purpose of producing storage batteries of differing types, and a plant is to be located at Greenwood avenue and the boulevard. N. G. Beamer has been elected president and general manager, William Ducharme vice president and treasurer, and George R. Beamer, the organizer, secretary and sales manager.

Ward P. Haines, who was for a considerable length of time advertising manager of the Anderson Electric Car Company, Detroit, Mich., maker of the Detroit electric pleasure and service wagons, has resigned that position. He has not announced his future plans.

MAIS COMPANY CLEAR.

Truck Company's Creditors Paid and New Organization in Control.

The Mais Motor Truck Company, Indianapolis, Ind., which has been controlled by a receiver since July, 1912, has paid all of the claims held by the receiver and the business is now in the possession of a company which has assumed the same name. Having freed itself from all outstanding obligations the concern is now said to be in excellent financial condition and the executives propose to promote business as actively as conditions demand. The company is now in charge of these officers: President, H. G. Francis, Rushville, Ind.; vice president, W. M. Pearce of the Innis-Pearce Company of Rushville, Ind.; secretary and treasurer, A. S. Lockard; superintendent, L. A. Caswell; purchasing agent, J. S. Sinclair.

The plant of the company is in excellent condition for manufacturing and is well equipped for all demands. The statement by the company is to the effect that the prospects for business are excellent and a considerable number of orders have been received for spring delivery, which insure constant factory activity. The company does not purpose to extend its line, but will produce the 1.5, two and three-ton machines, which will be built to the well known Mais design.

In connection with the reorganization there was delay through appeal by some of the stockholders from the order by the court for the receiver to distribute the assets of the company, but this order was later affirmed and carried out.

BID FOR GALION ASSETS.

A proposal has been made through the court for the purchase of the Cleveland-Galion Motor Truck Company of Galion, O., maker of electric internal service trucks, which has been in the hands of a receiver. W. J. Geer, in behalf of capitalists of Galion, has proposed to pay \$23,000 for the assets of the concern in installments of \$2500 on approval of the proposition, on delivery of the bill of sale, and at intervals of 30 days.

The statement is made that the Stanley Motor Carriage Company, Newton, Mass., is developing steam vehicles for freight transportation. The company has for several years adapted its machines for such purposes and the report probably originated in experimental work in the development of a steam tractor.

The American Electric Company has been incorporated at Augusta, Me., by Frederick A. Rand as president and Theodore Huss as treasurer, with capital of \$1,500,000, for the purpose of exporting, importing and generally trading in automobiles and their accessories.

ENGINE MANUFACTURERS MEET.

Standardization of Motors Urged and Exhibition at Shows Discouraged.

The Automobile Engine Manufacturers' Association, which was organized at Cleveland, O., early in December, with the stated purpose of promoting the interests of the industry, has inaugurated its activities systematically, these being determined at a meeting held at Chicago, Jan. 28. The association has made contract with M. Wulpi, who as commissioner represents several organizations of manufacturers, conducting a central bureau for them at 605 Monadnock building, Chicago, who will be the agent of the organization in that city.

The first general meeting was held at the Congress hotel, Chicago, Jan. 28, when 20 representatives of motor manufacturing concerns partook of a dinner and gave over the evening to informal discussion of shop subjects, one of the purposes being to learn the trend of opinions with reference to conditions generally obtaining.

The following day a business session took place, at which the affairs of the organization were considered and determinations were arrived at on several matters of importance. The committee on contracts made extended report in which was pointed out the fact that the industry experienced material losses through weaknesses in contracts, and suggested that this condition ought to be changed so far as possible. After consideration the association decided to recommend a form of contract that would be much more specific and decidedly stronger.

The subject of standards was considered at length and the members as a whole approved the proposition to standardize products so far as this may be done practically. The losses suffered through the deferring of contract shipments were discussed and it was proposed that this condition could be remedied on the basis of remunerative charges. This suggestion will be worked out to a satisfactory determination. Credits was a matter thoroughly discussed and with a view of safeguarding the interests of the members to the greatest extent possible. A proposition to prosecute all defalcations was generally approved and decision was reached to make public all attempts at imposition for the purpose of safeguarding the members of the association. The meeting considered from every aspect the exhibitions made in connection with automobile shows, and the prevailing opinion was that the results did not justify the time given to them and the expense incurred in preparing and exploiting the exhibits. To reach a satisfactory conclusion the meeting voted to canvass all motor manufacturers with an understanding that on the basis of replies received decision will be made whether or not to abandon exhibition at shows. The association now represents about 60 per cent. of

motor manufacturers of the country and about 85 per cent. of the entire output of the industry. The next meeting will take place at Chicago, March 20.

TAXICAB COMPANIES TO MERGE.

The Yellow Taxicab Company and the Mason-Seaman Transportation Company, which are the two largest competing taxicab companies in New York City, each being capitalized for \$5,000,000, are to be consolidated as soon as plans have been perfected, the merger having been approved by officials of both concerns and needing only the ratification of the stockholders. The Yellow Taxicab Company was formed by merging the New York Transportation, New York Cab, Connecticut Cab and Keeton Cab companies, and the control of this concern is held by Albert F. Rockwell, president of the New Departure Manufacturing Company, Bristol, Conn., and H. H. Schwartz is president. Charles R. Mason is president of the Mason-Seaman Company. The new organization will probably include some of the officers of both concerns. The consolidation is expected to result in material economies and larger profits.

MOTOKART CAPITAL \$500,000.

With capital named as \$500,000 under the New Jersey law, the Motokart Company of New York City has been incorporated, and the concern will take over the Tarrytown Motor Car Company, Tarrytown, N. Y., and the Steinbock Engineering Company. The Tarrytown Motor Car Company has manufactured and marketed the small delivery wagons, known as the Motokart, for a considerable period, and the engines and some of the components for the machines have been produced by the Steinbock company. The consolidation of the two concerns and the unification of the organization is expected to result in material economy and afford greatly needed expansion in a rapidly developing market.

The Continental Motor Manufacturing Company, Detroit, Mich., which is one of the largest manufacturers of motor vehicle and motor yacht engines in America, has begun a campaign for European business. It is to establish branches abroad, the first of which will be in Paris, France, in charge of R. A. Rothermel. The purpose of the company is to have service stations in connection with each branch it establishes.

A service station and assembling plant for the Gramm-Bernstein Company, in Tacoma, Wash., is now being erected. The building is to be of brick, two stories, 60 by 100 feet, and will have a salesroom on the first floor and a machine shop and assembling room on the second. The shop will have capacity to assemble eight trucks weekly.

BOSTON'S TRANSPORTATION PROBLEMS.

Night Haulage and Designation of Specific Routes for Cross-Town Traffic, with Systematic Control, Suggested for Relieving Day Street Congestion.

By William W. Scott.

BOSTON'S Transportation Problems" was the subject of the address made by W. W. Scott of MOTOR TRUCK to the New England section, Electric Vehicle Association of America, at a meeting the evening of Feb. 25 in the Edison Auditorium, 39 Boylston street, Boston, and as the title implies the consideration was of the conditions obtaining in the city and its suburbs. In one sense New England is affected by the situation from the fact that Boston is the second port in the United States and is a commercial centre of international importance, and a very large volume of business is concentrated and distributed from it.

Boston is peculiarly situated with reference to topography, and all traffic entering, leaving or going from one point to another within the city is concentrated on a few streets. The thoroughfares of the older portion of the city, in which a very large part of the business is transacted, are narrow and crooked, absolutely inadequate for the requirements of the day, and movement through these during business hours is necessarily slow and materially impeded by obstruction by loading and unloading vehicles, while sidewalk travel is equally retarded.

There are no direct channels for traffic across the city from the differing points of loading and unloading, and haulage from the wholesale district, the railroad terminals, docks, piers, manufactories, shops and stores are by circuitous routes, which cause material loss of time and decidedly increase the cost, and there is no system of supervision and control. Because of these conditions, which were described with a large map of the city, the application was chiefly directed toward possibilities for improvement practical through night haulage, through defined routes across the city, through

the regulation of traffic in these routes, through the inauguration of a systematic distribution with central receiving stations and suburban distributing stations by route vehicles, and by the use of motor equipment that would largely economize the street space now in use.

Following the address the conditions specified and the practical application of some of the suggestions for improvement were discussed to considerable length. The address in part follows:

I desire to emphasize that to bring about even reasonable conditions—such as obtain in cities that have been developed within a half century—is practically impossible. This could only be done through a systematic reconstruction that would be prohibitive in cost, and would be resisted by very large interests that could only regard the immediate future at the best.

But there is another aspect, that of providing for what is absolutely necessary if the city is to be developed as is hoped for, and as is desired, by the various civic, industrial and commercial organizations.

The time will come, no doubt, when every building will have facilities for shipping and receiving on private property, and this will eventually lead to system by which the occupants can be best convenience, but with rare exceptions such buildings have not yet been erected. The purpose of the builders is to utilize all of the available area for the use of the tenants. The Houghton-Dutton Company in 1904 erected the building at Beacon and Ashburton streets and vehicles can be driven into and from this at Ashburton street and loaded and unloaded, without interfering with traffic. This, to my knowledge, is the only instance in Boston where a firm has voluntarily made provision to handle its shipping and receiving off the public streets, and I believe I am right when I say that the company never made a better investment. There are properties so located that such provision could not be made, but any business of proportions must be established where every desired facility can be provided.

Some Congestion Inevitable.

There are conditions where congestion appears to be inevitable and a solution that would afford sufficient passage for traffic would apparently cause decided hardship. One of these obtains in North and South Market streets, about Quincy market and Faneuil hall. Many of the people doing business in this locality are in stores so small that you wonder why they are there, and the only conclusion is that they believe they have advantage in being in what is regarded as a centre. In a very small area hundreds of vehicles are usually standing, and movement through them is possible only with material delay. This congestion is extreme at times. If the vehicles were limited to the number that could be backed to the walks for loading or unloading, provision would have to be made for those waiting for places, and there is no logical place where the excess could be held. There are certain times in the day when the number of vehicles is comparatively small, and a possible improvement would be



Business District of Boston, Showing the Cobweb of Narrow and Crooked Streets Between Charles River and Fort Point Channel, with but One Direct Route (Washington Street, Shown by Heavier Shading.) Through City from South to North—Greatest Congestion Is Within the Area of Which the Postoffice, Indicated by Black Circle, Is Centre—Black Blocks Represent the North and South Stations, Shaded Blocks Common and Public Garden, and the Small Outline Circle the State House—Top of Map Is Approximately North.

to assign vehicles to places during stated periods, requiring loading and unloading during those assignments, which regulation could be worked out with practical supervision. Another possibility would be the location of the stores and the shops in adjacent streets, but this could not be accomplished without concerted action and the co-operation of all interests, and I believe you will agree that the task of adjustment would only be possible through legislative authority and municipal control.

You who live in Boston and vicinity do not realize how greatly business competition has increased the street traffic. You may go into the Jordan-Marsh Company's store at 4, order your purchase sent to Salem, for instance, and it will be delivered at its destination early in the evening. You may make a purchase at practically any of the stores at the hour of closing to be delivered in any locality within the 10-mile radius of the State House, and delivery will be made that day. The same condition applies to purchases made for delivery within the "city proper", which is defined as that section of Boston north of Fort Point channel and east of Massachusetts avenue, taking in a small section of Brookline. This delivery is made by the private equipment of the stores and approximately 350 different organizations engaged in transfer work.

The League of Express Companies is composed of about half the concerns doing expressing or haulage business, but this does not include those engaged in heavy transportation. Were these added the total would probably be increased by 100. Besides these two classifications there are those who do individual or incidental transporting—an unknown number. There are four general companies that do a business extending all over the country, there are 15 that do what may be regarded as a New England business, and the remainder serve the city and the suburbs.

There is an enormous duplication of service. One does not really understand how great is this duplication until one knows that in some instances as many as 24 different concerns are serving a single locality, to say nothing of the General Express companies' distribution and the incidental services. This means that while competition reduces prices materially the street traffic is proportionately increased. Many of these companies are concerns of considerable proportions, well organized, doing remunerative business, and, assumedly, making reasonable profits. Many that serve suburban districts have regular contracts with the big stores. The Jordan-Marsh Company, for instance, does business with at least 40 of them, to say nothing of its own equipment. These companies in many cases have regular traffic agreements and exchange business. One of the features of the transportation organizations of Boston are the offices of the General Express Company, which is a clearing house for more than 100 small companies that rent a box, have clerical service, have goods received for them, and unitedly pay for service that they could not otherwise obtain at great expense. Such facilities have promoted the growth and preserved the existence of many of these small concerns, and collectively they are a factor of material importance.

Transportation at Night.

Considering the conditions from another aspect we find that the traffic may be differentiated into classifications. These may be stated, without reference to importance, to be haulage to and from the docks and piers, from the wholesale houses to customers, to and from the freight terminals, from the coal yards and docks, the haulage of construction material, of the express companies and of the large stores, and added to this the casual or incidental requirements. I have only outlined these, and to point out that a very large part of the heavy transportation could be done at night. I am convinced that it would be intensely practical to do a great deal of the haulage by night at less expense than is now paid for day work. I say this advisedly, because when the proposition is considered one realizes that only five nights would be available and practically six days' work would need be done in five.

But night haulage would mean more than the mere use of vehicles if the purpose were to eliminate all of the traffic possible from the streets. We know that freight trains are generally operated nights because the greatest number of passenger trains are operated days, and this necessitates handling the bulk of the freight at the terminals by day. That a great deal of the haulage by street vehicle is during business hours was also an important factor. Vessel sailings are generally by night to convenience those who do not care to lose the business part of the day, and for the more convenient handling of the freights. I do not believe that it would be practical to advocate radical changes in leaving times of water lines, but there is no reason why freight could not be hauled to and from the piers, to and from the freight yards, and while this might necessitate adjustment of the working hours of men in warehouses, in large stores, in piers, in the terminals, I think this could be brought about without hardship. There would, however, be large accumulations of freight between Saturday mornings and Monday nights if this form of haulage were only done by night.

A great deal of the coal, ashes, supplies, etc., for the office buildings, could be hauled nights, and there is no good reason why some construction material could not be delivered between 6 at night and 7 in the morning, although the absence of light would probably prevent all of this work being done. Better street lighting and regulation of the traffic would be essential. It would be impractical to expect much of the suburban delivery to be done nights, because the volume of any given business would not be sufficient to justify the constant presence of men to care for the loads when delivered. While there are limitations of what haulage could be done, there is no doubt that a considerable volume could be eliminated from the day traffic.

Reorganization of Service.

Night haulage would mean the reorganization of some of the services. I mean that the presence of day and night shifts would mean doubling the supervision and the constant attendance of those keeping record. Arrangement would be necessary for the receipt of loads delivered, and unless the haulage was of sufficient volume those requiring the work would not be willing to co-operate. The economy for the owners of vehicles must be considered from this aspect as well. There is no doubt that transfer work from warehouses, piers, terminals, to stores, and vice versa, if done at night, could probably be contracted for. I mean that this would afford opportunity for concerns to make contract for haulage, and this would mean economy for every interest.

If the people of Boston could be satisfied with delivery within a reasonable time after purchase in any of the stores of importance, there is no doubt that a great deal of the haulage into the suburban points could be done at night. This would mean the establishment of stations in different localities where the goods could be received, sorted and distributed. Let us assume, for instance, collections made in any given section, carried by trucks to a point where a general station were located, received, sorted and distributed from that station, the distribution being by route. This would simplify conditions immensely, eliminate a great deal of equipment and would minimize expense.

Boston has had an experience with a proposition of this kind on a very limited scale when the Boston Auto Express Company was established in December, 1900. The company purchased six electric vehicles and 16 gasoline machines and established stations in Chelsea, Brighton, Dorchester and Somerville, hauling the packages for a number of the stores from a central station in Boston. Despite the crudity of the machines and the handicap of the illness of the executive, an excellent organization was developed, and had there been available the same quality of equipment as can now be procured there is no doubt that it would be in existence today.

There are conditions that militate against such a proposition, among them being the sending of goods for approval, C. O. D., for examination, the handling of complaints through an intermediary instead of direct, and the impossibility of a store to preserve its individuality with its customers, and not dealing with them direct, but as against this one may point to the economy and to the fact that for 42 years one concern has engaged in parcel distribution in Boston and served the people to their satisfaction. I refer to the Boston Parcel Delivery Company. There are other companies not doing as large a business, but, I believe, these are equally successful.

The establishment of the suggested suburban stations would not be practical if the purchasers expected delivery as quickly as they do now. Such a system would be practical for distances of from 20 to 25 miles from Boston, but this would probably mean the delivery each day of the sales of the previous afternoon and of that day up to noon. One result would be the elimination of many of the so-called express companies. Distribution of this character would necessarily be undertaken by a concern of large resources, well organized and prepared to develop a business of substantial proportions.

Considering One-Way Streets.

One means of regulating traffic has been by establishing one-way streets, and while these undoubtedly reduce the number of vehicles materially, this is accomplished by causing other traffic to travel further, with corresponding delay. The benefit may be obtained, but it is at the expense of others who are undoubtedly entitled to consideration. Much better results could be obtained by prohibiting loading and unloading in congested streets during specified hours, by designating routes from one section of the city to another and having supervision that will keep this traffic moving, giving the route traffic precedence over that from certain side streets. We can learn a fact or two from London, where in the main routes the traffic is not held to permit the crossing of the traffic from the side streets. Vehicles from side streets are required to turn into the main route and leave it one or more blocks beyond. This might be applied where needed.

The street commissioners of Boston have supervision of the traffic, I believe. That is, the commission determines the regulations, which are enforced by the police. I am inclined to believe that this body would be glad to receive suggestions from those who have studied conditions and submit them for consideration. I believe that a committee of this section, from the Electric Motor Car Club, from the motoring organizations, and from the different civic bodies, the Chamber of Commerce, for instance, should consider the subject of better traffic regulation, and after study from every angle determine what will apparently best meet the conditions. With this as a basis the people as a whole can be educated. Time will be necessary, but the earlier the work is begun the better the results will be. Municipal and perhaps state legislation may be required. The streets are used more each year and safety is the first factor. The next is economy.

The possibilities for street economy through the use of motor vehicles are so obvious that I have felt that discussion of their use is almost needless, but without possibility of any other relief than by means of motorized equipment the haulage of Boston could be done with less than half the number of vehicles now utilized, and when you realize that a motor wagon or truck requires about half the street space required by animal transports of similar capacity you will see that such a transformation would be a wonderful progression. In other words, the haulage of Boston could be done with the use of about 25 per cent. of the street space now necessary for the actual needs of traffic.

ROAD BUILDERS' OFFICERS.

The new officers elected by the American Road Builders' Association at the annual meeting held in New York City recently, include the following: President, W. A. McLean, a commissioner of the department of public works, Toronto, Ont.; first vice president, George W. Tillson, Brooklyn, N. Y., consulting engineer; second vice president, A. W. Deane, Boston, Mass., chief engineer, Massachusetts highway commission; third vice president, Austin B. Fletcher, Sacramento, Cal., state engineer, California highway commission; secretary, E. L. Powers, New York City, editor "Good Roads"; treasurer, W. W. Crosby, Baltimore, Md., consulting engineer.

GOVERNOR JOINS AUTOMOBILE CLUB.

Governor Walsh of Massachusetts has become a member of the Bay State Automobile Association of that state, being elected to honorary membership following his entertainment by the association and a conference with leading members relative to the motor laws of the state. As the Bay State Automobile Association is identified with other organizations of owners of motor vehicles in discouraging hostile legislation proposed, and in promoting measures that will be beneficial, the members believe that they will receive consideration from the governor, before whom all laws must come for approval, even if denied that courtesy by the legislators.

The Maxwell Company has succeeded the Western Parlor Frame Company at Plymouth, Wis., and will, with capital of \$25,000, begin the exclusive production of bodies for motor equipment for undertakers' use. Hearse bodies will be built to specifications for individual customers, and to standard designs for the requirements of motor vehicle manufacturers. The company is stated to be the only concern that is manufacturing the specialties stated.

The Little Giant Truck Company of Boston has been established at 221 Columbus avenue, Boston, Mass., as factory branch of the Chicago Pneumatic Tool Company, and the business is in charge of Gentry Clark, who was formerly identified with the Garford branch in that city.

J. J. Martin, who was for a year and a half connected with the Commerce Motor Car Company, Detroit, Mich., has been appointed district manager for the Middle Western States for the Stewart Motor Corporation, with headquarters in Chicago.

The Nashville, Tenn., branch of the Goodyear Tire & Rubber Company has been placed in charge of W. E. Dermot, who was for several years connected with the motor truck department of the company located at Akron, O.

KNOX PROPERTY FOR SALE.

Springfield Plant and Equipment Offered in Market as Going Concern.

The entire property of the Knox Automobile Company at Wilbraham road and Waltham avenue, Springfield, Mass., consisting of the site, factory buildings, machinery, fixtures, supplies, parts and automobile vehicles finished and in process of manufacture, has been offered for sale by Charles G. Gardner, trustee in bankruptcy, and will be disposed of either at private sale or public auction, this having been authorized by the United States district court. This property is one of the best of the kind in America, being so located that the west side abuts the property of the New Haven railroad, the company having the exclusive use of a spur track extending the full length of the factory, a distance of about 800 feet, this affording the best of shipping and receiving facilities. The factory buildings are of brick, one and two-story, approximately 800 by 115 feet, and the floor space is 241,355 square feet, or about 5.5 acres. The land and buildings have been appraised at \$323,803.41, and are subject to a mortgage of \$36,900, and the machinery and equipment have been appraised at \$365,404.44, this giving a total valuation, less the mortgage, of \$652,217.85. The drawings and patterns and the merchandise inventory are valued at \$896,274.24. The total assets of the company are stated to be \$1,634,414.89.

The company has been operated in bankruptcy since Jan. 21, 1913, and from that date to Feb. 20, under a trustee, it did a gross business of \$1,250,242.41. During the past few weeks the number of sales has increased and the prospect for future business is decidedly encouraging. During the period stated the company has specialized the manufacture of Knox-Martin tractors and fire apparatus, selling 48 pieces, and 112 tractors, the total selling price being approximately \$661,000. The company, as it now is, is regarded as a going concern, there being a large demand for parts for Knox cars throughout the country, these machines having been produced for about 13 years. The plant is fully equipped for the manufacture of motor vehicles of all kinds. By vote of the directors the purchaser of the plant will acquire the good will of the business and the right to use the Knox name. Proposition for the purchase of the whole or any part of the real estate or personal property will be entertained by the trustee, who may be addressed at Wilbraham road, Springfield, Mass.

W. S. Campbell, formerly connected with the Iron Trade Review and the Daily Iron Trade as circulation manager, has been appointed advertising manager of the Miller Rubber Company, Akron, O.

The Swinehart Tire & Rubber Company, Akron, O., has appointed J. G. Cass manager of the company's branch at Cleveland, O.

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OLD DRY BATTERIES renewed, about 1c each. Instructions, 25c. CROWN CHEMICAL CO., Hamilton, O.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., APRIL, 1914

No. 4

BUYERS FLOCK TO BOSTON TRUCK SHOW.

**Productiveness and Promotive Value Very Large, the Attendance Exceeding All Records---
Few Innovations Shown, the Builders Generally Standardizing or Specializing
a Single Type---Several Adopt Foreign Practise.**

REGARDED from any point of view—the representation of the industry, the volume of business transacted, the attendance, the interest of the people, or the specific promotion of highway vehicle transportation—the third annual exhibition of motor vehicles, organized by the Boston Commercial Motor Vehicle Association, at Mechanics' building, Huntington avenue, Boston, March 17-21 inclusive, was a success. As a matter of fact it was more than a success when one considers the conditions in which it took place—that is, the attitude of the Automobile Chamber of Commerce and the Motor and Accessory Manufacturers, for both these organizations classified this and the pleasure car show as "local"

displays and refrained from supporting them, the members being prohibited from participating save through the representation of agents.

The Boston pleasure car shows have invariably been larger than either the New York or the Chicago exhibitions, gauged by number of vehicle exhibitors, number of vehicles shown, business transacted and attendance. The Boston truck shows have been

large and productive, exceeding from every point of view the exhibitions elsewhere. But these proportions, and their actual promotive value to the industry, for New England today owns from 12 to 15 per cent. of the entire number of motor wagons and trucks in actual service, were completely lost sight of, and the shows, because they were controlled by the

local associations, were designated "local".

It may be well to explain that the Boston Commercial Motor Vehicle Association is composed (as is the Boston Automobile Dealers' Association) of agents for manufacturers and direct representatives of those maintaining branches, and these organizations have assumed all responsibilities, financed the shows, and, naturally, shared

the profits. When the magnitude of the exhibitions—they have for years been the largest of the country—is considered, the business possibilities must be such as to justify them, and the policy that would restrict them cannot be regarded as being anything else than shortsighted, for the endeavors of the agents and representatives are shared proportionately by builders of vehicles. Whatever measure of success they attain



General View of Grand Hall from the Balcony, Showing the Principal Truck and Wagon Exhibits on the Main Floor.



The Exhibit of the R. & L. Company, Which Included the Garford Trucks and the Willys Utility Delivery Wagons.

must necessarily be with equal profit to the industry, and supposition that limiting publicity and promotion will be to the benefit of a few is not well founded. As to the direct profit of those who sell accessories, supplies or equipment, there is no doubt that the greater the volume of sales the more the manufacturers and selling agents will benefit.

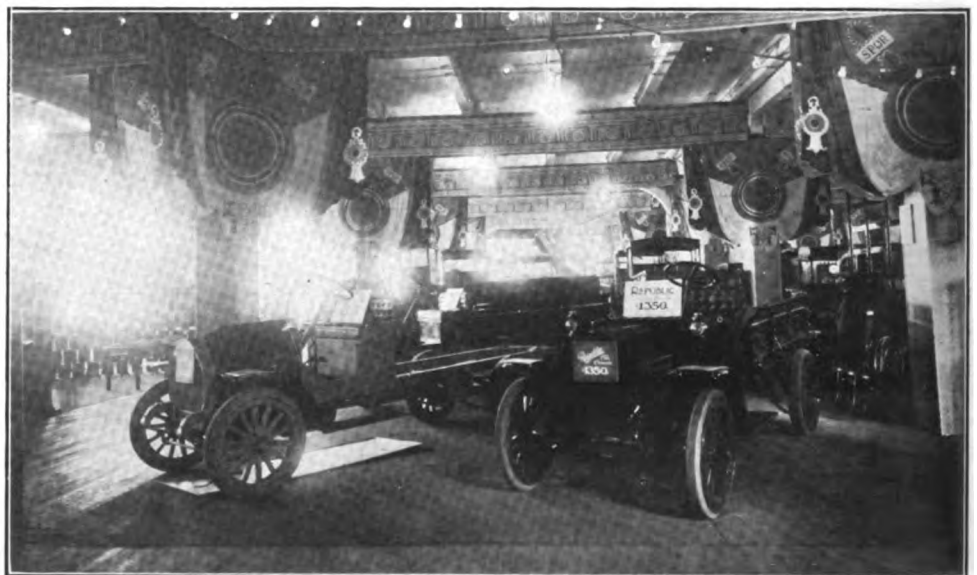
The Boston truck show was promoted by the members of the association because they, having accurate knowledge of the market and the conditions in which they do business, had confidence in the financial possibilities and were willing to assume all responsibilities and obligations. The exhibition was organized on sane lines, and the only reason for it being in any way identified with the pleasure car show was the fact that the time selected was the most propitious of the entire year for promoting the sale of haulage equipment, when the plans for the season's activities have been determined and preparations must be quickly made. Logically, business men could not be expected to invest capital in motor vehicles in January when these would not be needed for at least three months, and yet this was the belief of those who had organized motor truck exhibits in New York and Chicago. The motor truck show of a year ago was a success, despite the fact that those held more than two months previous were not especially productive to the exhibitors.

Productiveness has been a characteristic of all Boston's exhibitions. They have been regarded as real trade institutions, and the number of transactions has always

been large, for in addition to Boston and its suburbs visitors have been attracted from the six New England states and from the Canadian provinces. Motor vehicles are no novelty and their usefulness and utility are thoroughly understood, and the proportion of persons attending the Boston show who purpose to buy is extremely large. The real advantage is to see a considerable number of machines and compare them in conditions that are favorable for comfort and convenience. For any man to examine as many vehicles as were seen at the Boston show and understand

them thoroughly, would require as many days as hours were necessary in Mechanics' building, to say nothing of the actual expense and loss of time, as well as other material factors. Few persons will devote time to inquiry into the relative merits of service wagons without a motive, and it is also apparent that the real promotion possible from the personal interest of those visiting the shows is of material importance. By this is meant that the men who go to exhibitions of vehicles with the purpose of informing themselves of such types as will meet their requirements, usually influence their associates and friends, and for this reason they do a great deal of promotive work, the value of which depends largely upon the quality of the information they have gathered.

The Boston motor truck show of 1914 was interesting from many aspects, and so far as attendance is concerned it was record making. The statement that



Republic Delivery Wagons Shown at the Stand of C. J. Fischer, the New England Agent, Located in Exhibition Hall.

approximately 50,000 persons visited the building during the five days the show was in progress is official, and demonstrates that the exhibition was attractive to a very much larger number than would be assumed.

The number of vehicles disposed of during the show was large, but estimate is not practical because sales were consummated that had been negotiated previous to its opening, and many transactions will undoubtedly result from inquiries made while the exhibition was progressing. The overlapping of the transactions precludes anything like the whole number being stated with accuracy, but the exhibitors as individuals were unanimous in their estimate—that the show was not only productive beyond expectations, but the stimulus to business would be realized during the entire season. Experience had demonstrated to the exhibitors that if they were to regard show sales only as results, and failed to consider the prospects that had been attracted and interested, they were probably very wide of the mark.

The show as a whole could be designated as a "selling" exhibition rather than one at which agencies were made, although many of the New England agents and factory branches established representatives in such sections as were desirable. Some of the visitors who sought to make connections with manufacturers were forced to do business with the district or section agents, because of the policy of some to have representation by sub-agents, and were disap-



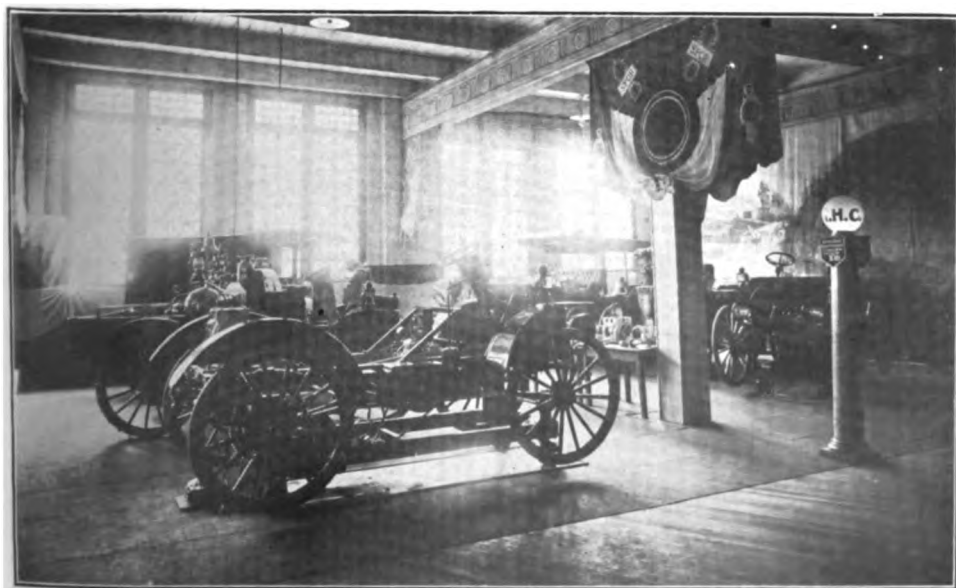
The Exhibition of the Myer Abrams Company, New England Agent for the Lauth-Juergens Delivery Wagons and Trucks.

pointed in not being able to secure as advantageous terms as were desired, or which would be possible through direct selling.

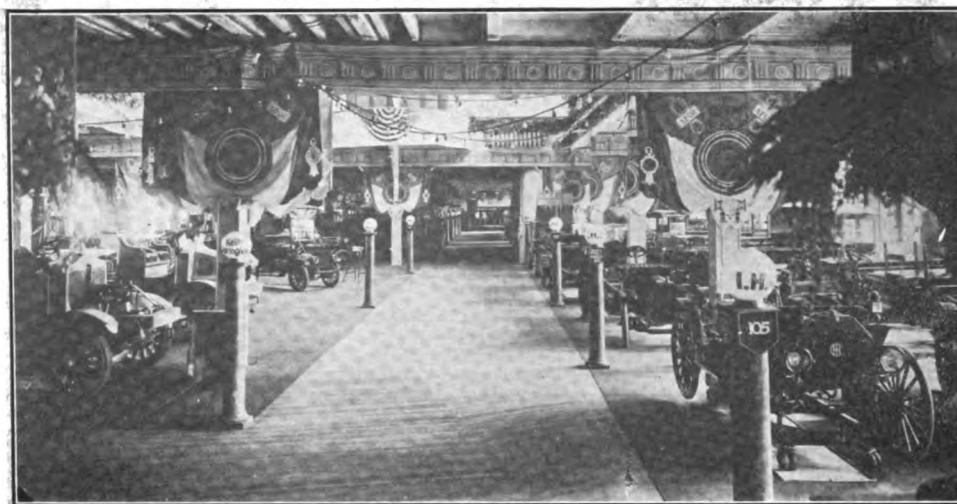
The show was made up of the exhibits of 33 different manufacturers, and included 32 makes of gasoline, two of electric and one of steam driven vehicles, and at the stands were seen 35 different makes of machines, there being 155 chassis, of which 116 were equipped with bodies, the stripped chassis exhibited being otherwise complete. In addition to this there was a machine not shown by its maker, but exhibited by the firm that constructed the special equipment mounted on it. As this apparatus was valued at approximately \$2500 aside from the chassis, it will be seen that this was of considerable importance. In the streets a considerable number of machines were used for demonstrating purposes, these being generally of the same types shown on floors of the halls. The number of vehicles practically filled the main floors of both

Grand and Exhibition halls, and the displays were confined to machines, there being very few parts shown. In fact, the show may be said to have been of chassis ready for the road, and of special bodies, which experience has demonstrated are the factors that have special interest for the buyers.

The exhibition was made with the elaborate decorations that were designed for the pleasure car show, and while these were pleasing to the eye, they were largely a matter of indifference to the visitors, and of really no practical value to those who came to examine and study the machines. Had



Where the I. H. C. Machines of Two-Cylinder High-Wheeled Construction Were Displayed in Exhibition Hall.



The Main Aisle of Exhibition Hall. Looking Toward the Principal Entrance, Showing the Kelly and I. H. C. Exhibits in the Foreground.

they been specially prepared for the show they would have been an extravagance, but because of being an inheritance from the pleasure car display they were a pleasing setting. As a matter of fact, what is especially desirable in an exhibition of this character is abundance of light and both sections of the building were well illuminated.

Show of Standard Productions.

When one considered the character of the exhibition it was noticeable that it was practically made up of machines that are known throughout the industry. The concerns represented were generally large and well established, and there were comparatively few new comers. There were but two electric manufacturers included in the exhibitors, as against eight that made display a year ago, and as one of these also produces gasoline machines in very large numbers, it will be seen that the electric service vehicle industry practically withdrew from participation, this making a considerable difference in the total of exhibitors. Comparing the lists of exhibitors of this show with that of a year ago, one finds that no less than 12 have discontinued production or no longer exist, and 10 of these built gasoline machines. There were but five exhibitors that could be regarded as new to Boston, and of these but three are new concerns, one being established about a year ago.

The show was noteworthy from the fact that there were no freaks and the constructions could be regarded as in every way conventional. There was but one vehicle of the cyclocar type shown, and this, being displayed near some of the largest machines in the exhibition, appeared practically like a toy in comparison. There

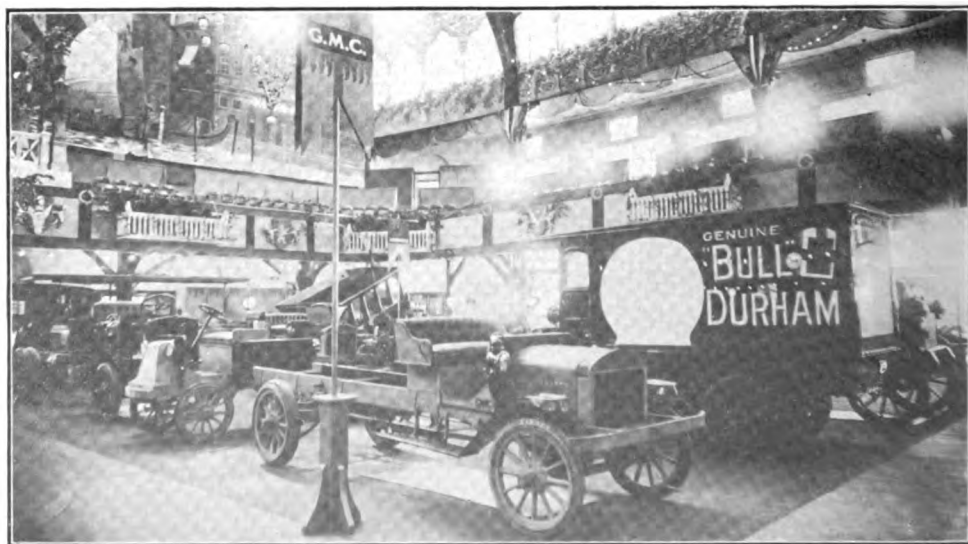
was one machine of the light car class exhibited, this being designed as a package wagon. Both these exhibits showed the evidences of hurried preparation for the show, but despite this fact they attracted much attention and were decidedly interesting.

Concentrating on Standards.

Considering the mechanical aspects of the exhibits one may summarize in the statement that practically all the manufacturers have concentrated on standards and have generally adhered to one design, although machines may be made

in different sizes. In some instances there is variance with reference to minor details, but as a rule standardization appears to be the general object, this making for greater manufacturing economy and simplification of production.

Two manufacturers continue to use the horizontal two-cylinder opposed motor, these being the Autocar and the International Harvester, and these machines are practically unchanged. The designs have been continued, the Autocar with the motor mounted transversely in the chassis frame, and the I. H. C. with the motor installed longitudinally. Two others, the Parcel Post and the Merz machines, use two-cylinder motors, but these are the vertical V type, with the cylinders at an angle of 45 degrees from each other. The Autocar and the Merz are the only two in which there is no option for the purchaser, as the I. H. C. machine is supplied with either water-cooled or air-cooled motors, and the Parcel Post is built with either a two-cylinder air-cooled or a four-cylinder water-cooled engine. The Parcel Post wagon exhibited was driven by a two-cylinder, air-cooled motor, and for this reason



The Display of the General Motors Truck Company in Grand Hall, Showing the Special Body Built for the Animated Advertising Company.

the classification stated is given.

The Autocar and the I. H. C. machines have been built to practically single designs and have been standards in the markets for a number of years. The Merz was designed as a cyclecar and the utilization for light delivery is regarded as practical, although the possibilities have not yet been demonstrated by material service. The Parcel Post Kar is another new production that has been worked out with the purpose of being specially suited for quick distribution of light loads.

Two Types of Three-Cylinder Motors.

There were two makes of three-cylinder motors exhibited, and both of these were of the two-stroke cycle types. The one was the well known Chase engine, which is probably one of the best known of the air-cooled type now in use, having been built without change for six years, and the other was the Palmer-Moore, that shown, however, being water-cooled. These motors are distinct in characteristics, the Chase being a conventional construction of the three-port design, while the Palmer-Moore is fitted with large area inlet ports that may be varied by means of rotary shutters, this affording a variable supply of fuel that will yield efficiency at any engine speed, from idling to the heaviest work. The Palmer-Moore motor is built both air and water cooled, there being practically no difference in construction aside from the jacketing of the cylinders, but the water-cooled engine is a comparatively new product.

Four-Cylinder Heavy Duty Motors.

There were in addition 28 makes of vehicles equipped with different types of four-cylinder vertical

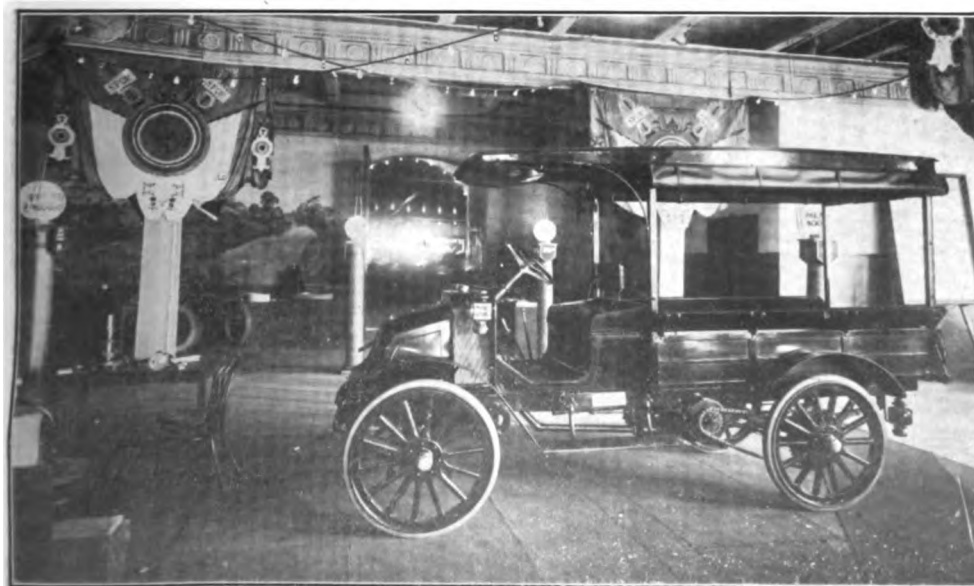


The Exhibit of the Knox Automobile Company, Grand Hall, with a Knox-Martin Tractor and Trailer with Dumping Body.

water-cooled motors, all of which were designed for heavy vehicle service, the majority having strokes somewhat in excess of the bore. Practically all of the manufacturers either use an engine built by a firm specializing them, or have developed their own design, there being no inclination to accept what has not been proven in all operating conditions. With reference to the motors the purpose of the designers is limitation of speed to minimize vibration and to secure satisfactory power production with practical fuel economy. There is realization that the public generally understands the capacity and utility of the four-cylinder construction, and there is no reason to undertake to educate the people to the qualities of what they are not familiar with. There is, of course, material variance with engines of conservative design, with reference to bore, stroke, valve location, lubrication and cooling, to say nothing of control, governing, ignition and other important factors, so that the motors have as much to interest as though they differed widely in principle.

There is no doubt, however, of the education of the industry to the necessity of heavy construction, a quality that was particularly noticeable in the heavier machines, for great strength and large bearing surfaces for all contacting and wearing parts is recognized as being absolutely essential for the long endurance demanded and required of service vehicles, and as the only certain insurance against economical maintenance and upkeep. This influence was reflected in the motors as well as in other details.

There were comparatively few worm and gear driven machines, these including the Pierce-Arrow, which is the only type built by the maker; the 3000-pound Universal, both of which are well known, and the 3000-pound Atterbury



The Palmer-Moore Delivery Wagon, Equipped with a Three-Cylinder, Two-Cycle, Water-Cooled Motor and Four-Post Express Body.

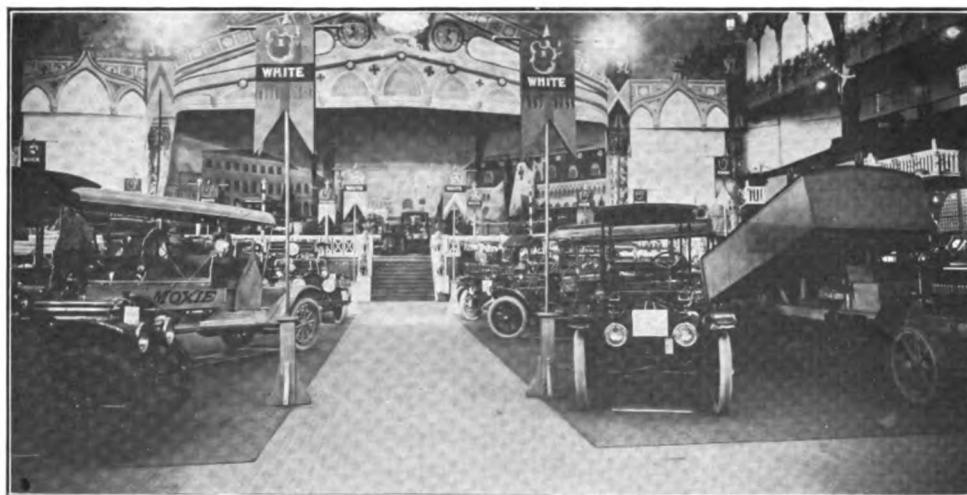
wagon and the 6000 Chase model O truck. The two last mentioned are new productions and were seen for the first time. While there has been no determination with either concern as to the further use of these designs, they are specially interesting. The Chase truck is a combination of American and French practice, and with a view of meeting a demand for a vehicle of recognized standards it is propelled by a four-cylinder water-cooled engine, this being a unit power plant of a Continental motor and Brown-Lipe transmission gearset. The drive is direct from the gearset through a propeller shaft to a David Brown worm and gear in a full floating rear axle, and instead of the usual radius rods the driving thrust is through the front ends of the rear semi-elliptic springs.

These springs are underslung, this making possible a comparatively flat arch, and the forward end is secured in a deep hanger that is strengthened by webbing to take the driving thrust. The rear end is free to move in a long shackle. This is probably the first time in America where the worm and gear drive

sign in that the same general idea of construction that has been described in the Chase truck has been applied to it. This machine, however, has the conventional method of coupling the driving shaft, there being two block and trunnion universal joints between the rear axle and the gearset. The springs are seated on the steel housing of the rear axle, and these are with a comparatively flat arc. The forward ends are secured in the spring hangers by large hardened steel bolts. The springs have heavy master leaves and main leaves of equal length, with eyes bushed with phosphor bronze. The rear ends are carried in spring shackles. In this machine the full driving thrust is sustained by the springs, which have not the nearly straight forward section that is so noticeable in the Chase design. The springs have very large seats and the axle housing is trussed to add to its strength.

The Walter Front Wheel Drive.

Another example of the spring being used instead of the radius rod is found in the Walter trucks, which are built under the Latil patents, and in this the front end is shackled and the rear end is pivoted in the hanger, so that the machine is literally drawn by the front wheels instead of a thrust being exerted upon the frame. It would be possible to fit forward radius rods, but experience has proven that these are not necessary, and the construction obviates the possibility of their use limiting the turning radius of the wheels. The use made of the springs in this design has been proven by years of experience, and there is no well founded engineering objection to be made to it.



The Main Aisle in Grand Hall, Looking Through the Exhibit of the White Company, Toward the Stage, on Which Was the Packard Display.

has been utilized where the traction thrust is taken wholly by the springs and the experience with the construction will, no doubt, be very interesting to observe. The springs are made with the master leaf and the main leaf the same length, the eyes being extremely large and bushed with bronze, with unusually heavy nickel steel bolts that take the drive. The main driving shaft has two universal joints, or rather flexible couplings, these being of the Daimler type, consisting of spiders with three arms each, which are bolted to three leather rings, the bolts being secured with keystone washers that equalize the stress upon the leather when the shaft is turning.

The rear axle is housed in a one-piece crucible steel casting, with squared end sections, and the worm shaft, gear wheel and differential are carried by a heavy plate that is bolted to the housing, these being removable as a unit, should occasion require work or examination.

The Atterbury 3000-pound wagon is unusual in de-

The Walter front-driven trucks were shown for the first time in Boston—in fact, for the first time in America—but a Latil truck was displayed at New York in January, 1913. The Walter truck, however, differs considerably from the foreign design, and adaptations have been made to meet conditions known to exist in America. The Walter engine has been modified to some extent. This is a very long stroke type and while the rating is apparently small, the long stroke justifies the claim of 40 horsepower. The statement made refers to the five-ton size, which was shown, for the company builds the front drive trucks in three, four, five, six and 7.5-ton sizes, and it also produces the Walter rear wheel driven 2000 and 3000-pound wagons. Because of the demand for a front wheel driven two-ton machine there is a probability that one of this size will be added. When specially ordered 3.5 and five-ton rear wheel trucks will also be built. It will be understood that it is the purpose of the company to specialize on front driven construc-

tion, but it has also designed a four-wheel-driven machine in which the rear wheels are driven by a second countershaft mounted on the dead rear axle, from a propeller shaft extended back from the transmission gearset case. This is intended for use as a tractor, because of its short wheelbase and its small turning radius, and to carry a load not exceeding four tons and draw two trailers each carrying a similar load. This is a maximum of 12 tons.

The Latil trucks are occasionally built with a chassis that is wholly mounted on the front wheels, to which it is practical to couple a frame carrying a body, to which is attached rear wheels, thus converting animal equipment, but this idea is not seriously advocated for American use. The Walter machines are constructed so that the frame at the rear is suspended on semi-elliptic springs, and these are seated on a dead rear axle, the rear wheels being shod with wide steel tires. The forward wheels are fitted with rubber block tires, the units being set diagonally in the rims. With this construction the machine may be mounted forward only on rubber tires, or on all four wheels, according to the requirements.

Another innovation is the use of brakes that operate on every wheel. The service brake, applied by a pedal, checks the forward wheels through the transmission shaft, and the rear wheels by expanding shoes in drums on the rear wheels, and the emergency brake increases the pressure on the brake shoes in the rear wheels, affording a much greater efficiency.

The Velie One-Ton Chassis.

Another new machine is the Velie one-ton wagon, which is designed to meet the requirements of those who need fast delivery of moderate capacity. This design is in every way conventional and from the sturdy construction is intended to be extremely serviceable. The machine has a 45 horsepower vertical, water-cooled, L-head motor, with cylinder bore of 4.625 inches and stroke of 5.25 inches, the cylinders being cast in pairs. The engine is with all moving parts enclosed and protected. The crankcase is sectional, the lower half containing the oil reservoir, and the upper half the main and camshaft bearings, so that the operating parts may be reached by removing the lower portion. The motor is cooled by water circulated by a large centrifugal pump through ample water jackets and a honeycomb radiator, and radiation is promoted by an 18-inch fan driven by a flat belt. The lubrication is by a combination system, the oil being drawn from the reservoir by a gear-driven pump, and the overflow forms a pool from which the motor is lubricated by the sweep of the big ends of the connecting rods. The ignition is a Bosch

dual system and the carburetor is an automatic float feed type.

The clutch is a multiple dry disc with Raybestos and steel contacting surfaces, having a single adjustment, fully enclosed in the flywheel. The transmission gearset is a selective type with three forward and reverse speed ratios, and the drive is by a propeller shaft to the full floating rear axle, there being two Spicer universal joints in the shaft. The frame of pressed channel section steel has side members 5.5 inches width and this carries a sub-frame in which is mounted the radiator, power plant, clutch and gearset. The frame is carried on semi-elliptic springs, 40 inches length forward and 50 inches length rear.

Full Floating Rear Axle.

The rear axle is a full floating type, containing the reduction gearing as well as the differential, and the shafts are mounted on roller bearings. All parts are adjustable for wear. The front axle is a drop forged heat treated I section. The wheels are wood, artillery type, mounted on roller bearings forward, and are fitted with either 34 by 3.5 inches solid shoes forward

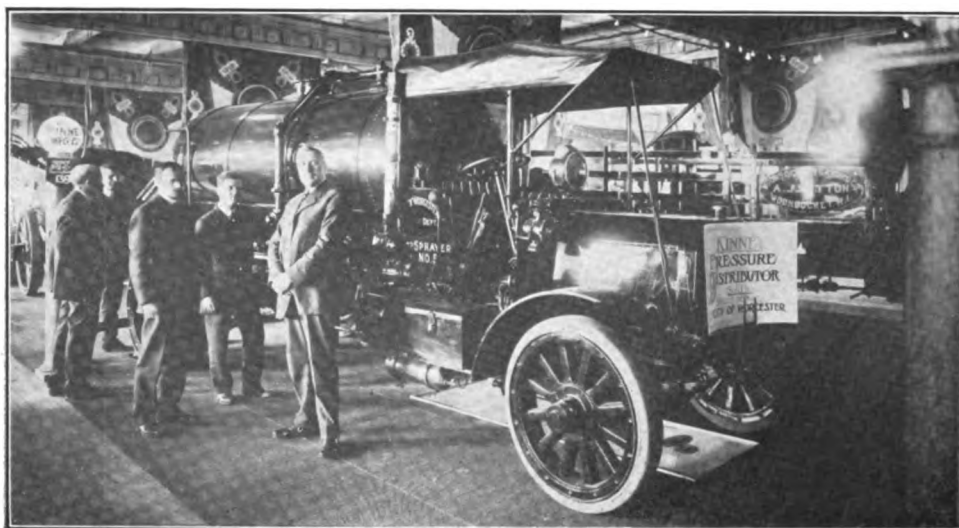


The Stand of the Whitten-Gilmore Company, at Which Was Shown the Exhibits of Standard Trucks and Federal Wagons.

and 36 by four inches rear, or 36 by five-inch pneumatic tires. The steering gear is irreversible, of the worm and sector type, at the left side. The ignition is fixed, but there is a fuel supply throttle lever on the steering wheel, and the speed lifting lever and the emergency brake lever are at the centre. The accelerator is operated by foot pedal. The service brake, actuated by a foot pedal, contracts on drums on the rear wheels, and the emergency brake shoes expand within the same drums. The speed is 15 miles an hour. The wheelbase is 129 inches, the tread 58 inches, the clearance 11 inches and the turning radius 17 feet. The equipment includes a Gray & Davis electric starter and generator, electric head, dash and tail lamps, and electric horn.

The other sizes of Velie machines shown were practically unchanged, the principal improvement being in the size and construction of the jackshaft brakes.

The Federal exhibit was of interest in that these



The Combination Tank Truck of the Kinney Manufacturing Company, Adapted for Street Watering, Oiling or Tar Application on a Peerless Chassis.

wagons are now made with rating of 3000 pounds capacity, the parts being strengthened wherever necessary to meet the increased requirements. The L head motor, which was with cylinder bore of 4.25 inches and stroke of 4.5 inches, with the cylinders cast in pairs, has been replaced with an engine with the L head cylinders cast en bloc, with bore of 4.125 inches and stroke of 5.25, this considerably increasing the power. The radiator is changed from a vertical tube to a cellular type, and the jackshaft design from the semi-floating to the full floating construction. The jackshaft service brake has been increased from 12 inches diameter and 1.5 inches face to 13 inches diameter and two inches face, and the emergency brake on the rear wheels has been made three inches width instead of 2.5, these adding materially to the braking efficiency. The rear axle has been increased from a rectangular section two inches square to two by 2.5 inches, and the rear tires have been increased from four to five inches width. The tread of the rear wheels has been increased from 56 to 59.5 inches.

The Universal worm and gear driven chassis, which was formerly rated at 2000 pounds capacity, has been given a rating of 3000 pounds through the use of heavier components whenever necessary to strengthen the construction to carry the load. There has been no change in the design, and the power plant used is the same.

The only changes in the Stewart delivery wagon chassis, which is of 3000 pounds capacity, is the use of a Daimler type of leather flexible joint between the clutch and the transmission gearset, this taking the place of the

trunnion and block type of joint that has been used, and a plunger accelerator pedal is substituted for the lever formerly employed.

Several Republic chassis were exhibited, one of these being stripped and the others fitted with express bodies. This machine has been in the market practically a year, but this was the first time it was seen at Boston. It is a standardized 3000-pound wagon, constructed of components selected with a view of securing long endurance, and designed to afford complete accessibility

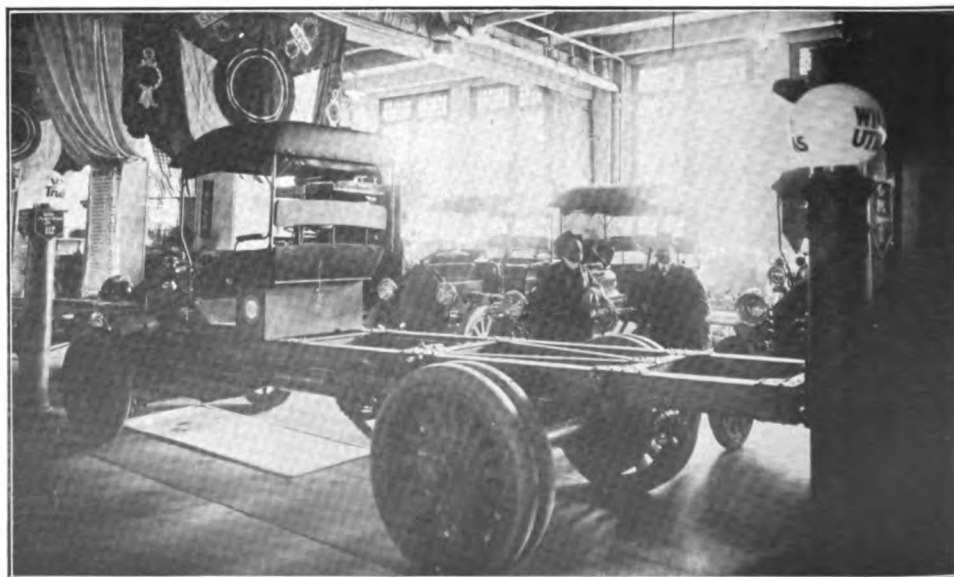
and economy of maintenance and upkeep.

One of the features of the display of Packard machines was the four and the six-ton chassis, these being two new sizes which follow the design of the five-ton type. The other Packard machines are continued with practically no changes, and these are built in 4000, 6000 and 10,000-pound capacities.

The Palmer-Moore Company, Syracuse, N. Y., showed in Exhibition hall a single machine, this being a chassis with a water-cooled, three-cylinder motor, which was equipped with a four-post express body. This exhibit attracted no end of attention from the fact that it was the first time the engine, with variable inlet ports, had been seen.

Merz Car Friction Driven Type.

The only machine fitted with the friction form of power transmission was the Merz cyclecar parcel delivery wagon. This is driven by a two-cylinder V engine of the type commonly developed for motorcycles, installed transversely in the frame, the engine shaft carrying a driving disc that contacts with a



A Section of the Stand of the New England Branch of the Velle Motor Vehicle Company, Where a Large Display Was Made.

wheel movable on a jackshaft, and the power is transmitted by V belts from pulleys on the jackshaft to pulleys on the rear wheels. This construction allows great variation of power application and speed, and the utilization of the exact energy that is necessary to perform a given work. The body is constructed with the roof extended forward to form a cab, and the driver is provided with a very comfortable seat and is well protected. The body is intended to carry 350 pounds, and has sufficient space to take a considerable bulk. For light work, where quick delivery is desired, the machine will undoubtedly serve a very useful purpose, for it can be operated and maintained at very small expense.

Little Giant Machine Redesigned.

The Little Giant delivery wagon, which has a load capacity of 2000 pounds, has been practically redesigned, the two-cylinder opposed motor being replaced by an engine of the conventional four-cylinder, water-cooled, L head type, with the cylinders cast en bloc, having a bore of 3.75 inches and stroke of 4.5 inches. The crankcase is divided, the lower section being the oil reservoir and the upper half carries the bearings, shafts, timing gear, etc. All the working mechanism is enclosed. The lubrication is by combination force feed and splash, the circulation being through a sight gauge on the dash. The ignition is by low-tension magneto and transformer coil, with dry cell battery for starting. The motor is cooled by thermo-syphon circulation through a vertical finned tube radiator. The engine is mounted in a sub-frame suspended at three points.

The clutch is a multiple disc type, operating in oil, and the transmission gearset is a selective form with three forward speed ratios and reverse. The clutch and gearset are assembled as a unit with the jackshaft, which is suspended at three points. The drive is by side chains from the jackshaft to sprockets on the rear wheels.

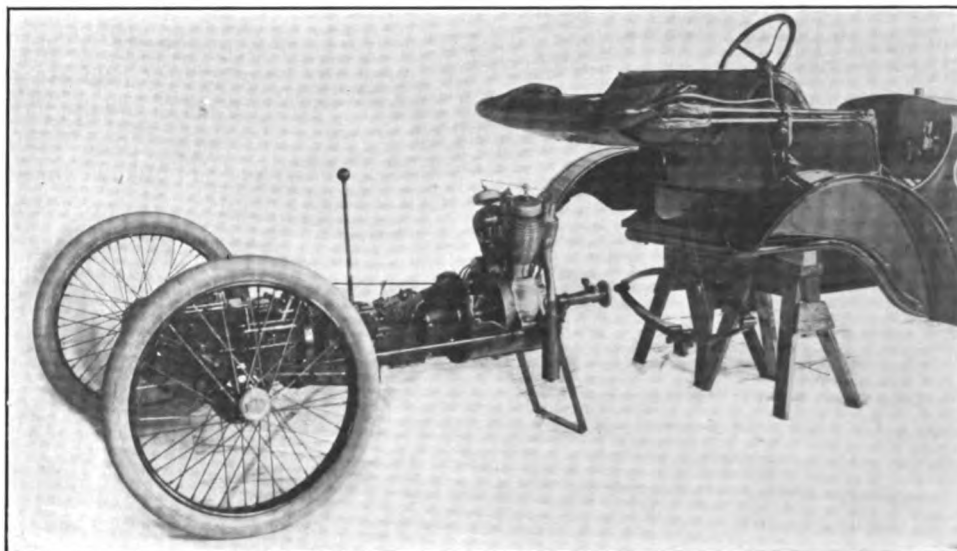
The frame is a pressed steel channel section four inches width, this taking the place of the truss construction formerly used. The frame is mounted on semi-elliptic springs, with a jackspring mounted above the rear axle. The axles are rectangular sections, the front two by 1.5 inches and the rear two inches square, and the wheels are 36 inches diameter with three-inch tires forward and 3.5 inches width rear. The steering gear is a worm and sector type that is irreversible, and is located at the left side. The ignition and fuel supply control levers are on the steering wheel and

speed changing and the emergency brake levers at the centre. The brakes are both external contracting, the service brake operating by pedal on the jackshaft and the emergency brake on the drums on the rear wheels. Because of the motor being under the driver's cab the wheelbase is 110 inches and the tread is 56 inches.

Two New Standard Types.

The Pierce-Arrow machines were of the standard type, there being no changes whatever in the constructions, but the two-ton chassis was exhibited for the first time in Boston, though it has been in the market for practically a year. The lighter chassis differs somewhat from the larger, the designs not being identical.

The Kelly exhibit included the new K-35 and the K-50 types, these being two and five-ton capacity machines, the older models being the one and three-ton sizes. But there is practically no variance in design, the difference being in the proportion of the



The Unit Power Plant of the Parcel Post Kar Assembled with the Rear Axle and So Installed That It Can Be Quickly Removed for Work When Necessary.

parts. The Kelly productions have been standardized in the fullest sense of the term.

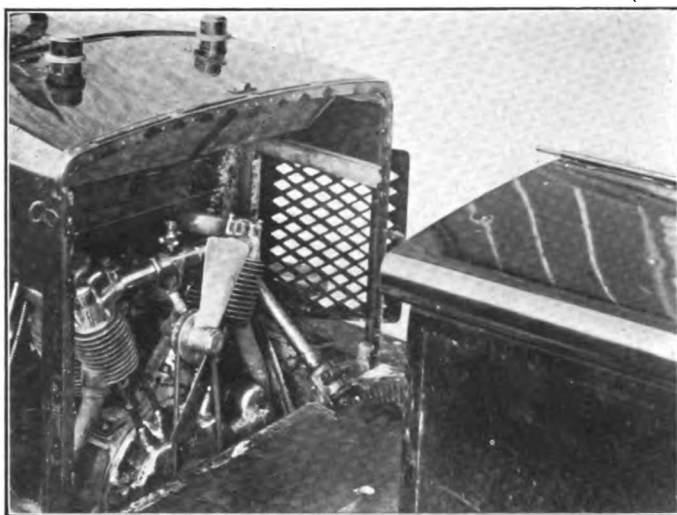
Only Show Minor Improvements.

Aside from the increase of the size of the jackshaft of service brakes there has been no change in the Jeffery wagons, which are of 1500 and 2000 pounds capacity respectively.

The motors used in the 2500 and 4000 pounds capacity GMC wagons have been somewhat improved to minimize noise in operation, but the designs have not been varied from. The radiators have been changed from the honeycomb to tubular types, with the top and bottom tanks cast, so that the centre sections may be removed quickly in the event of needed repair. Other than this no variance has been made in the designs and the other sizes have been continued without change.

Parcel Post Kar a Novelty.

The Parcel Post Kar was the novelty of the show in that it is a construction differing widely from con-



The Power Plant of the Parcel Post Kar as Installed, Easily Accessible from the Sides or by Sliding the Body Forward.

ventional practise, and the design had evidently been developed with a view of meeting many requirements. Ease of operation and accessibility for work, so that one man could give any attention necessary, were the principal purposes in view. The power plant is located practically in the centre of the chassis, and it is so combined with the rear axle and wheels that the assembly can be removed from the frame body and forward construction in a comparatively short time. The body is forward of the driver, and the driving seat will contain two, it having the general characteristics of the small runabout body. The machine comes within the "light car" classification, but it has normal wheel-base and a slightly narrower tread.

The Parcel Post Kar has a wheelbase of 90 inches and tread of 52, and is equipped with wire wheels, 30 inches diameter, shod with pneumatic tires. The frame is tube and is underslung, being carried on two long semi-elliptic springs forward and a full elliptic spring mounted transversely above the rear axle. The forward half of the frame is given over to a box or compartment that is normally 56 inches length, 27 inches width and 18 inches depth. This box is so installed that it may be drawn from the chassis with a moment's work, and it may be carried forward whatever space is necessary to work on the motor, if this cannot be conveniently done through the doors at either side of the body.

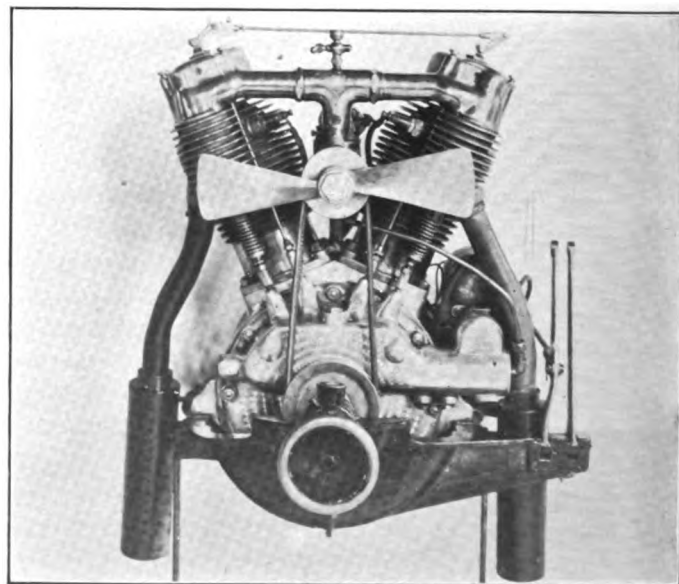
Back of the box is the engine compartment. The motor may be either a twin-cylinder vertical type with the cylinders at an angle of 45 degrees, of the usual motorcycle construction, having bore of 3.5 inches and stroke of 3.5625 inches, and cooled by air, or a water-cooled, four-cylinder block motor with bore of 2.5 inches and stroke of four inches. The two-cylinder motor is rated at 10-12 horsepower and the four-cylinder at 12-14 horsepower. The description, aside from the engine, may be applied to either type of machine.

Unique Power Plant Assembly.

The power plant and power transmission assembly consists of the motor and a multiple disc clutch that is operated in oil, a transmission gearset of the

conventional sliding gear construction, affording three forward speed ratios and reverse, and the rear axle. The main driving shaft of the gearset carries a sprocket instead of a pinion, and a roller chain transmits the power to a sprocket incorporated with the differential assembly in the rear axle. This chain is driven in a bath of oil. From the motor to the rear axle the housing is continuous, and none of the working parts are exposed. This assembly is carried on a ball trunnion at the centre of a frame cross member, and it is supported by the two wheels at the rear, the body being mounted on the frame, which is suspended on the transverse full elliptic spring. The construction is such that by releasing the forward trunnion and the engine connections at the front end and the spring at the rear, the body and frame may be lifted and the chassis moved forward and the engine supported on two legs or standards for convenient work.

The rear axle is the usual live type, the wheels being keyed to the driving shafts. The shafts are mounted on Hyatt roller bearings. The steering column is at the left side with the gear shifting and brake levers at the centre. The brake lever operates a band fitted with cork inserts that contract on a drum within the rear axle housing, this being the emergency or hand brake, and it is ratchet retained when set. When the lever is pushed to an extreme forward position it can be used to start the motor, which is connected by linkage with a shaft carrying a pair of ratchet arms that engage with a six-inch gear that in turn meshes with a pinion on the engine shaft. The quick backward movement of lever brings one of the arms into engagement with the gear, and a clutch is engaged when the pinion is forced into contact with a collar on the engine shaft. As the pinion is free, and is forced into engagement by its helical teeth contacting with the gear, it is automatically disengaged when the motor begins firing. The starting device is enclosed and thoroughly lubricated. The clutch pedal also serves a



The Two-Cylinder Vertical Air-Cooled Motor of the Parcel Post Kar Removed from the Chassis as a Unit.

two-fold purpose, the first movement disengaging the clutch, and pushing it further forward applies a brake to the transmission. On the steering column is the fuel supply lever. The ignition is by an Atwater Kent Unisparker. The fuel is carried in a tank on the dash in the engine compartment.

Buffalo Electric Foot Control.

The Buffalo electric chassis shown was fitted with a patented foot control, by which, when the service brake is applied and the controlled handle is unchanged, the machine, as the brake pressure is released, will gain speed proportionately to the degree the brake pedal has returned to its normal position, just as it would were the controller handle moved forward. With these machines there are five forward speeds and these are obtained in order by pushing the controller handle forward. When in the fifth position, at top speed, and the service brake is applied and the machine stopped, without movement of the controller, the vehicle will continue stopped so long as the brake pressure is maintained. As the brake is released the vehicle will accelerate in precisely the same manner as though the controller were operated, and in the same ratios, so there is no possibility of a quick start being made that might be dangerous, no matter what the condition of operation. Aside from this feature the machines are unchanged.

Splendid Display of Body Work.

There was much attention given to body construction by the manufacturers, and what was undoubtedly the best exhibition of special equipment ever seen in any show made bodies really a feature. The White company's display was unusually diversified, this including practically every type that might be regarded as standard, as well as numerous special designs. These ranged from the 1500-pound wagon with highly ornamented panel body to the five-ton truck fitted with power hoist, and from the patrol wagon to the fully equipped combination hose and chemical fire wagon. The White display of specially finished bodies was especially attractive. The Packard exhibit was large and was generally made up of chassis equipped with bodies in general demand, these being of the express and dumping types as a rule.

The stand of the General Motors Truck Company contained both gasoline and electric machines, these being some fine examples of standard body work, but the interest was centred in a machine built for the Animated Advertising Company, which was one of a number, both gasoline and electric, that will be equipped for use in different sections of the country. The electric vehicles will be used in the cities, and the gasoline outfits will be sent over long distances, one of these being intended for a trip from Boston to San Francisco. These machines have enclosed bodies with glass sides and ends that are painted with different designs, but a portion of each side and end is made opaque. Within the bodies are installed electric storage batteries that actuate mechanism, and on the opaque glass colored pictures are shown in motion.

These vehicles are to be driven through the streets, the painted signs to serve by day, but at night the bodies are to be illuminated and the pictures shown. The first order is for a dozen machines, which will be sent wherever they can be used advantageously.

The Autocar Company showed a large number of standard chassis, each fitted with a body designed for a special service, and one of these machines was equipped with the smallest dumping installation exhibited. A number of these were delivered to Boston and suburban purchasers directly following the show.

The showing of fire apparatus was confined to exhibits by the White company, which was a remarkably handsome apparatus, a Knox-Martin tractor coupled to a converted horse steam fire pump, and an I. H. C. wagon that was designed specially for village use, it being light and yet carrying sufficient equipment to combat fire in the average residence.

The only exhibition of trailers was made by the Knox Automobile Company, which showed several Knox-Martin tractors equipped for general heavy haulage. These machines were of the standard type and no details of construction have been changed. At the Locomobile stand was shown a truck fitted with a McGarry body, which was attached to a dead wagon, and was intended for use in hauling or handling lumber.

The Garford company's agent exhibited one of its standard six-ton truck chassis equipped with the regular dumping body and power hoist specialized by this concern, as well as a number of truck chassis, some with platform and express bodies, and the Willys Utility wagon chassis, both with and without equipment.

The exhibit of the Buick Motor Company included a number of panel and screen express and open bodies, as well as a stripped chassis. One of the machines was noticeable for the load of ladders on it.

The KisselKar branch showed several completed chassis and several others with standard bodies. There was a very attractive showing of the four sizes of Lauth-Juergens trucks made by the New England agent, and these were all fitted with standard bodies. A three-ton Mais chassis was displayed by the United States Mill Supply Company, which has the New England agency for this machine, and which is to open a branch at Boston that will be operated in conjunction with its headquarters at Providence.

The showing of Reo two-ton machines was interesting because of the body constructions, while the Selden trucks exhibited were stated to be absolutely unchanged in any detail. One of the features of the Standard trucks displayed was the dumping body and power hoist, a chassis with this equipment being prominently located. The only steam machines shown were the Stanley, which were exhibited with panel and express bodies, and one chassis was fitted for passenger work.

The Kinney Manufacturing Company, Boston,

Mass., showed on a Peerless five-ton chassis is a 1200-gallon tank with equipment that adapted it for sprinkling or oiling streets, or applying tar of any consistency. The tank has a number of tube flues and a short stack at the forward end. At one side is carried a tank containing kerosene. At the rear of the tank is an asbestos-lined box containing two large plates, against which the kerosene is injected under pressure and forms a vapor that will ignite. When the plates become heated the kerosene vapor becomes gas that burns with intense heat. This is carried through the tank and heats the contents to any point, the temperature being regulated to a thermometer. With this the tank may be used for applying any tar preparation, which may be carried any distance, and used at whatever consistency is desired. The contents of the tank are forced from it by a pressure pump operated by the motor, set for whatever pressure is desired, and so constructed that should the outlets be closed the pump will by-pass, this obviating possibility of damage. The outlets are in two sections and they may be carried to either side to avoid obstructions, crossings, or to cover the turning radius. The tank may be cleaned by injecting hot steam into it when desired, and prepared for use with oil or water, the pressure pump insuring a constant head and even distribution. A number of these machines have been sold to municipalities and they have been found to be exceedingly practical. The equipment is designed for installation on a number of standard makes of machines.

The accessory and supply exhibits were limited in number, they being confined principally to those that were practical for service vehicle equipment or use. One that attracted attention was the Avon airless tire, made by the American Tire Company, Avon, Mass., this being composed of layers of wool felt. The layers are retained in place by a composition that does not affect the resiliency of the shoe, and the tread is composed of a fiber facing that is claimed to resist water or oil, and is extremely enduring. The tire is maintained to be lighter than rubber, proof against puncture and will not saturate and become compact when used in water or mud.

The following were exhibitors of machines:

Atterbury—Mattapan Motor Car Company, Mattapan, Mass.
Autocar—Autocar Sales and Service Company, Boston, Mass.
Buffalo—Buffalo Electric Vehicle Company, Buffalo, N. Y.
Bulck—Bulck Motor Company, Boston, Mass.
Chase—Chase Motor Truck Company, Syracuse, N. Y.
Federal—Whitten-Gilmore Company, Boston, Mass.
GMC—General Motors Truck Company, Boston, Mass.
Garford—R. & L. Company, Boston, Mass.
I. H. C.—International Harvester Company, Somerville, Mass.
Jeffery—C. P. Rockwell, Inc., Boston, Mass.
Kelly—Kelly-Springfield Motor Truck Company, Somerville, Mass.
Kissel—Kissel Motor Car Company, Boston, Mass.
Knox—Knox Automobile Company, Boston, Mass.
Knox-Martin—Knox Automobile Company, Boston, Mass.
Lauth-Juergens—Abrams, Myer, Company, Cambridge, Mass.
Little Giant—Little Giant Truck Company of Boston, Boston, Mass.
Locomobile—Locomobile Company of America, Boston, Mass.
Main—United States Mill Supply Company, Providence, R. I.
Merz—Merz Cyclecar Company, Indianapolis, Ind.

Packard—Packard Motor Car Company of Boston, Boston, Mass.
Palmer-Moore—Palmer-Moore Company, Syracuse, N. Y.
Parcel Post—Parcel Post Equipment Company, Cambridge, Mass.
Republie—Alma Motor Truck Company, Alma, Mich.
Reo—Linscott Motor Company, Boston, Mass.
Selden—Boston Motor Company, Boston, Mass.
Stewart—Maddocks, H. Ross, Company, Boston, Mass.
Standard—Whitten-Gilmore Company, Boston, Mass.
Stanley—Stanley Motor Carriage Company, Newton, Mass.
Universal—Magill, W. F., Boston, Mass.
Velle—Velle Motor Vehicle Company, Cambridge, Mass.
Walter—Walter Motor Truck Company, New York, N. Y.
White—White Company, Boston, Mass.
Willys Utility—R. & L. Company, Boston, Mass.

BOOMING ITS MEMBERSHIP.

Electric Vehicle Association Endeavoring to Increase to 1000 Members.

The membership committee of the Electric Vehicle Association of America, of which Joseph F. Becker is chairman, is making a vigorous campaign to increase the total of members from 560, which it now has, to 1000 before the annual convention in October. The committee in this work has sought the co-operation of all the members and has requested each to make a personal endeavor to secure one application at least, assuring them of any assistance that can consistently be given in this work.

The committee has undertaken this work systematically, first obtaining from every member of record confirmation of his name, address and other essential data, this insuring communication with them on all subjects of interest, and that all facts of importance relative to organization are placed before them. The committee is also obtaining from the members opinions as to the benefits derived from membership and whether or not they are receiving all the advantages that are practical or possible, and inviting suggestions as to what might be done to enhance the benefits.

The committee points out the fact that the officers and the members of the committees need co-operative help, the individual endeavors of members, to bring about activities that will have greater scope and be more productive, and develop the association on healthy and constructive lines. The members are urged to assist to the extent of securing the application of one new member, and sending the names of five prospects for the committee to endeavor to interest. The committee has prepared some interesting promotional literature, which emphasizes the advantages of membership in the association, pointing out the extremely broad scope of its endeavors wherever electricity is used.

The association now has branches or sections in New York, Boston, Chicago and Philadelphia, and promotion of additional branches in southern California and the extreme Northwest, which are expected to fructify within a comparatively short time, is now in progress. The association has increased materially since the Chicago convention, and the applications are coming in steadily.

MOTOR TRUCKS OF AMERICA.

"Motor Trucks of America" is the title of an unusually handsome volume of 112 pages published by the B. F. Goodrich Company, Akron, O., which might be expressed as being a tabloid autobiography of 95 different makes of machines, these being given in brief uniform specifications of each type produced. This volume is the second of the kind published by the Goodrich company, the first being issued a year ago, and the demand for it was so great that decision to continue it as an annual feature was reached.

The statement is made that the purpose originally was to show a number of representative motor trucks that were equipped with Goodrich wireless solid tires, affording information that is not generally supplied to the public, and to illustrate some of the types that might be considered standards in the market. Because of the requests made and the desire of manufacturers to be represented the second volume was materially increased in size. There is one illustration of each make of machine and the specifications are systematized and arranged so that much useful information is presented in brief form.

The book is cross-indexed so as to give both names of the trucks and the manufacturers, and contains an article by W. J. McDermid on "Efficiency in Buying and Operating Motor Trucks", which was first printed in the Review of Reviews, and an "Efficiency Guide for Buying Commercial Motor Cars", both of which are of special interest to the person using or considering the use of freight vehicles. The book is not distributed broadcast, but a copy can be secured at request addressed to the truck tire department of the B. F. Goodrich Company, made on the business stationery of responsible persons.

BAKER ELECTRIC SALES COMPANY.

The Baker Electric Sales Company has been incorporated at Chicago, Ill., and it is to be a direct factory branch of the Baker Motor Vehicle Company, Cleveland, O., and will market the Baker pleasure and freight vehicles in that city and vicinity. The branch will be under the management of Richard S. Greifen, who will be assisted by W. E. Henn.

The Autocar Sales & Service Company, Baltimore, Md., a branch of the Autocar Company, Ardmore, Penn., is now located in a new building in Cathedral street, removal being made from temporary quarters at 1010 Morton street, which were occupied after the destruction of the company's station by fire Feb. 20.

H. L. Smith, who is well known in the industry and trade, has been made manager of the St. Louis branch of the Kelly-Springfield Tire Company, succeeding John D. Lindsay, who recently died.

CONTRACT MAIL SERVICE.

The contractors for carrying mail between different postoffices, branch offices and railroad terminals and piers have, since the establishment of the parcel post service, been forced to extremes at times to do the work required of them with the equipment available, because of the unexpected increase in volume of sacks, for this is the measure by which the mail carrying is gauged. The contractors have to make their trips between points on schedule, and delay means penalization unless the cause is beyond their control. In small towns and villages the mail haulage has increased very largely, but the conditions are vastly worse in the larger cities, where accumulations are frequent because of the retardations of the trains.

Not infrequently a driver will be forced to carry additional sacks, although normally the government requires that all the sacks be locked in a body so that there can be no possibility of theft, and covered so as



Studebaker Panel Body Delivery Wagon Used by a Mail Contractor at Detroit, Mich.

to prevent damage from rain, and in such exigencies the resources of the clerks in charge of the work are severely taxed. An instance of what may result is shown in the accompanying illustration, which is that of a Studebaker delivery wagon used by O. H. Baldwin, a Detroit contractor, where after the body was filled the sacks of mail were piled on the roof, the running boards, the seat and the fenders and motor hood. Obviously the need was a larger vehicle, but as the contractors are expected to do their work for a stated price they necessarily use what will be the most serviceable the greater part of the time and meet emergencies when they arise as best they can.

The Y. R. Del Valle Company, Los Angeles, Cal., agent for Koehler 2000-pound delivery wagons, is finding a very ready sale for chassis equipped with bodies seating 12 persons, and has placed a considerable number of these machines in that city and vicinity.

WORK TRUCKS CONSTANTLY.

Garford Machines Operated 22.5 Hours Daily in New York Aqueduct Building.

Working 22.5 hours daily, Garford 6.5-ton trucks in the service of the Pittsburg Contracting Company, which is building one of the sections of the great tunnel that is to bring a supply of water from the Catskill mountains to the Metropolis, are doing each day as much haulage as could be accomplished by 30 two-horse carts. This appears to be an enormous volume of work, but not only is it possible, but it is done constantly. Of course the conditions are favorable, for the machines are seldom idle for a moment. In fact they are stopped only for half-hour periods for the crews to eat a lunch, and are taken by the one crew after the other, the men working in eight-hour shifts through the day.

The contractor regards the trucks merely as so much machinery that can be operated as nearly as possible to capacity, and aside from such attention as will keep them to the highest efficiency the main purpose is to keep them moving. The company is working in what is known as the down-town section of the city and the material is taken from the tunnel at several shafts and carried to a dump at 129th street, near the Hudson river. To complete the work within the period allowed a specified progress must be made daily, and the excavated material must be taken away as quickly as is practicable, for any accumulation would impede the workers.

Each truck has capacity of 6.5 tons, and each trip is made drawing a trailer that will carry a like volume of material, so that each haul a total of 13 tons is drawn. The loading is done from large hoisting buckets and the discharging is by gravity, so that the greater part of the time the machines are moving between the shafts and the dumps. The shifts begin work at 8 in the morning, 4 in the afternoon and at midnight, and aside from the replenishment of fuel and oil nothing is done on the trucks save during the half-hour allowed for lunch, when garage mechanics go over them carefully and make whatever adjustments are necessary.

Thus the machines are inspected three times daily, and any condition that is developed is ascertained. Despite the fact that the trucks are worked practically three times as much as the average vehicle, this close supervision keeps them constantly operative, and thus far no time has been lost. Apparently the work can be continued with this system for an indefinite period. Obviously, the saving that is made is very large, for the average price for a two-horse cart and driver in New York City is practically \$6 a day, and a day's work would be 10 hours, normally. Considering the difference in the working time the trucks are each doing in 24 hours work that would require 24 two-horse carts, each working 10 hours daily.

EXCLUSIVE TRUCK GARAGE.

A garage designed for the exclusive accommodation of the users of motor trucks and wagons, and to afford service to the owners of large transportation equipments who now maintain independent garages or store their vehicles in combination stations, is planned for Cleveland, O., and is to be erected in Carnegie avenue. The plan comprehends a structure 75 by 570 feet with a rear wing 95 feet width, with a two-story head house and a single-story structure back of this, which will be lighted by a saw-tooth roof. The building is to be of concrete and steel, fireproof, and the cost will be about \$125,000 with the equipment. The garage will be equipped for the storage of both electric and gasoline vehicles. Statement is made that a number of department stores and other large users of machines have assured their patronage, they expecting to obtain more economical as well as specialized service. In connection with the garage will be a salesroom and there will be a sales department maintained by the company operating it.

LICENSING BILL ABANDONED.

A bill before the New York legislature which provided for the licensing of all drivers of motor vehicles, whether owners or servants, was abandoned at a hearing held at Albany, March 11. The bill provided that every owner should be examined, that his photograph should be attached to the license to insure identification, and that while driving a badge should be displayed prominently on his outer clothing.

General Sales Manager W. H. Moore of the Gramm-Bernstein Company, Lima, O., started April 1 on his annual visit to the agencies of the company, starting for the southern states. Mr. Moore expects that the business of the company in the South will be materially increased the coming season.

The Kissel Motor Car Company, Hartford, Wis., has just published a book that contains more than 350 illustrations of KisselKar trucks and wagons now in service. This book is very interesting and demonstrates the greatly diversified uses that may be made of these machines.

Because impaired health impelled a long rest and relaxation from business, C. E. Mathewson, for 12 years western representative of the Diamond Rubber Company, resigned that position March 21 and began preparations for a journey that will take him round the world.

With capital of \$830,000 the Salom Electric Storage Battery Company has been incorporated by H. E. Latter, W. J. Mahoney and O. J. Reichard, all of Wilmington, Del., with authority to manufacture storage batteries and electric apparatus and appliances.

BUSINESS EXPANSION FROM MOTOR TRUCKS.

Remarkable Increase of Retail Trade, by Routes and Stores in Boston and Vicinity, by Hood & Sons, New England's Largest Independent Dairy Company.

BUSINESS development through the utilization of motor vehicle haulage equipment has been the ideal of every power wagon or truck salesman. The subject has been so frequently presented to business men that at least a majority believe they are fully conversant with it. Any suggestion of possibilities seldom has full significance, because of supposition that theory, and not practise, is the basis. Or, to put it another way, the value of the phrase has been lost because of its constant and very general use.

For this reason the term business expansion has been substituted, and that there shall be no misunderstanding this has been applied to increase of transactions that could not be realized in any other manner than by the service of motor vehicles. The statement that a dairy business has been expanded to several times its proportions within approximately three years, because motor wagons and trucks were utilized for transporting, may appear to be extravagant use of language, or at least an enthusiastic presentation of the subject, particularly when the qualification is made that a very small part of the delivery is made directly by machines.

Yet there is probably no better illustration of the possibilities of efficient highway transportation than the business of H. P. Hood & Sons, which is claimed to be the largest independent dairy company in New England. The concern has headquarters at 494 Rutherford avenue, Boston, this being in the Charles-

town district, close to the freight yard of the Boston & Maine railroad, and it has branches as well as stores in Boston and its suburbs, besides commercial connections in a number of the principal cities.

The company is not a contractor in the sense that is usually applied to those dealing in milk. It is a producer and a distributor, and while it purchases milk in large quantities for its own customers, it may be regarded as a retailer. The contractors are those who purchase milk by contract with the producers, having stations to which this is shipped, and in turn delivering it to those who retail it, the contractor being practically the jobber or middleman.

The contractor and jobber have business relations with the producers who supply them to the extent of

furnishing cars which are hauled by different railroads and the milk is delivered at the stations in season for shipping, so that one or a number of cars may be attached to a train, and a considerable number may arrive within a stated period at a terminal. The contractors may deliver milk in large quantities to customers, or it may be hauled by them, so that in the majority of instances when it has been received and turned over to the buyers the problem of distribution is for others to solve.

Milk is a distinctly perishable commodity and susceptible to contamination, and much care is taken to see that it reaches the market in condition to use as food. Milk purity is regarded as the greatest quality that can be stated, and volume of business and price are entirely dependent upon it. The Hood & Sons business has been established for a long time, but its growth was to a large degree dictated by the means of



Also Truck of 6.5 Tons Capacity with the Big Body Built for Haulage of Bottled Milk in Cases—The Largest Machine of the Equipment.

transportation that would justify the firm in attempting to serve communities. The reason was that the concern has sought to establish its products as specialized, and wherever sold the name of the firm has been identified by the public as being linked with quality.

Does a New England Business.

Hood & Sons owns a farm of 1000 acres at Derry, N. H., which has on it upwards of 350 head of stock, the cows being of breed that produce milk of a required standard. In addition to this source, milk is obtained from other producers in New Hampshire and Massachusetts. The company originally dealt only in milk and cream. But it now does an extensive business in butter, cheese, buttermilk, condensed milk and eggs.



Autocar with the Special Crate Body Adapted for Carrying Cases of Bottled Milk—Six of These Machines Are in Regular Service, Two of Them for Special Delivery.

The main station is at Rutherford avenue, but it has branch stations at Forest Hills and South Boston in Boston, at Lynn, Salem, Chelsea, Medford, Malden, Brookline and Bemis, and in Manchester, N. H.; Nashua, N. H., and Lawrence, Mass., and it has 20 branch stores in Boston besides the central office or principal store in South Market street. In addition to these places of business directly under its own control it has numerous agents in other cities, and its products can be obtained in practically all of New England, from Manchester on the north to Springfield on the west, and Newport and New Bedford on the south.

Assumedly the reader will regard the business as wholesale from what has been stated, but when it is known that the company owns approximately 400 horses, with which delivery is made from the branches to families and similar customers by more than 325 different routes, the volume of the retail custom can be understood. With this number of animals and the 325 milk routes to be served every day of the year, the value of the motor wagons and trucks may not appear clear, but without them the business could never have obtained its present proportions, and it would not be practical to undertake distribution of anything like the quantity of milk.

To understand the situation clearly a word of explanation is necessary relative to the railroad facilities. Boston is south of the Charles river, save the Charlestown and East Boston districts. The Boston & Maine railroad enters the city to the North station, but the freight yards are in Charlestown. The Fitchburg and other railroad properties merged with the Boston & Maine use the same passenger

terminal, and the freight yards are in Charlestown. The New Haven railroad and its allied property enters the South station from the south and southwest. The freight yards are along Albany street, and the Boston & Albany railroad, now controlled by the New York Central, which enters from the west, uses the same terminal. Thus the railroad services that use the same terminals are separated from each other by the Charles river and by the business districts of Boston, and it is impossible to make transfer of cars from one system to the other within a

reasonable distance of the city.

The Boston & Maine railroad controls the railroad traffic from the northern part of Massachusetts and Maine, New Hampshire and Vermont, while the others similarly control traffic in the remainder of Massachusetts, Rhode Island and Connecticut. But at Boston the freight terminals are separated. For this reason the firms dealing extensively in milk—and the Derry farm is the cogent reason with Hood & Sons—located as closely to the railroad terminal in Charlestown as was practical. This situation being understood it will be evident that all products received at this Charlestown plant of the company must be sent across the river to serve Boston, Brookline and Bemis, and to the cities of Chelsea, Malden, Lynn and Salem and the town of Medford at the north. Manchester, Nashua and Lawrence are not served from Boston and have for the time being no connection with the distribution with which this article deals.

Main Plant at Charlestown.

The main plant of the concern extends back from Rutherford avenue to the Boston & Maine freight



Some of the Machines at the Garage, a Two-Ton Truck in the Entrance, a 6.5 and a Five-Ton Truck at the Curb and the Autocar Wagon in the Court.

yard, and there are sidings on which the cars containing the milk are stationed for unloading and loading with the containers. The main building, in which the milk is received and prepared for distribution, extends along one side of a court or yard, and at the side of this building is a long shipping platform. The court is paved and is of such width that any vehicle can be turned without backing. As may be assumed the milk, cream, buttermilk, etc., is not hauled at the plant, the facilities being adapted for minimizing handling, but unless sent to customers who use it for manufacturing purposes it is always placed in bottles and these are of different sizes. The bottles are placed in racks for convenience in handling, these being of wood and divided into compartments of the size required.

Care to Maintain Quality.

The firm has devoted its endeavors to educating the people to the quality of its products, and has established a reputation that has made a demand that had been quite beyond the capacity of its organization to supply. The Hood milk has been obtained in conditions where extreme caution was taken to insure purity. The milk, wherever it is produced, is brought to Charlestown, and at the plant has been prepared for distribution. The dairying at the farms has been with every care that practical science could suggest. Were the milk sent to different plants it would not be possible to handle it as uniformly and with the methods that have been developed, and for that reason the centralization of the receiving and preparation has been productive of excellent results.

The firm prides itself on the general excellence of its plant and its organization. Seldom a day passes that large numbers of visitors are not received at the station, where every process of preparing the milk for distribution is demonstrated. As a rule the visitors are women. The company employs a physician, whose duty is to educate the people to the value of dairy products for food and to interest them in the Hood methods. He is constantly in contact with women's organizations, advising them of home hygiene and of means by which health can be preserved by care in preparation of foods in which dairy products are used, and he exercises a supervision over the plant, the branches, the stores and the distribution.

Because of the perishable character of milk and the necessity of hauling it long distances, great care is taken to keep it at low temperatures. Milk will not deteriorate so long as it is kept chilled. After cooling at the farms it is delivered to cars that are iced in

the warm period of the year and brought to Charlestown, where it is transferred to storage rooms and removed to the bottling department as needed. Because of the large quantity handled this work must be done according to schedule. Cars arrive at different times, day and night, and as the milk is received and made ready it must be distributed.

Retail Distribution by 325 Routes.

Each night at 1 o'clock from the different stations of the firm the route teams leave to serve their customers, for custom has decreed that milk must be delivered in season for breakfast if possible, and the greater part of the delivery is made before breakfast, and practically all of it by the middle of the forenoon. At Charlestown practically 100 route wagons are loaded, and in the three stables of the firm close to the plant are about 130 horses. At Forest Hills, which is a centre for the suburban portion of Boston, there is a branch that has a stable with 75 horses and about 65 routes are served from this station. At South Boston



Looking into the Yard of the Main Plant from Rutherford Avenue, Showing a Part of Its Depth, with the Long Loading Platform at the Right.

the branch has a stable with 25 to 30 horses and about 25 routes centre there. The Lynn branch serves upwards of 30 routes, the stable having 35 horses; the Salem branch has 15 routes and 18 horses, the Chelsea branch 15 routes and 17 horses, the Malden branch 15 routes and 17 horses, and Medford, Brookline and Bemis have each 10 routes and 12 animals. At Manchester the branch stable has 16 horses and 14 routes are served, at Nashua the stable contains 12 animals that are used on 10 routes, and at Lawrence there are nine horses and eight routes.

In the different sections of Boston the firm has 20 stores that are stocked with milk, cream, buttermilk, butter, cheese and eggs, and there are large concerns, such as the store of the Houghton & Dutton Company, that are supplied considerable quantities of all classes of stock. The stores are opened early in the morning and each must have whatever supplies of milk, cream and buttermilk are needed, but the other products can be replenished at less frequent in-



Closer View of the Loading Platform. Showing Some of the Trucks, Filled with Cases of Bottled Milk, Preparatory for the Start for the Branch Stations.

tervals. Previous to three years ago the company had branches at Forest Hills, Malden and Chelsea, and the supplies for these stations were hauled by animal vehicles from Charlestown. Since that time the other branches have been established, and the chain of stores in Boston developed, as well as customers served who could not previously be dealt with.

Motor Equipment of 19 Machines.

Nine years ago the company purchased a Knox truck and with this served a route of customers at Nantasket Beach, but conditions were not favorable at that time and after an experience covering one summer this section was abandoned. Three years ago the company purchased its first machines and it now has in regular use eight Alco trucks, one of 6.5 tons, two of five tons, three of four tons, one of three and one of two tons capacity, and six Autocar wagons with load rating of 3000 pounds each. Two small vehicles that were bought four years ago and have been used in delivery were found to be too light and have been withdrawn from general service and are retained as spares. In addition there are three pleasure cars that are used by the general manager, the company's physician and the manager of the motor vehicle department.

The use made of the trucks and the Autocars is much more continuous than in ordinary service. The trucks are moving from 17 to 21 hours a day, and as milk is delivered to all of the stations seven days in the week, it will be understood that the mileage continues Sundays, although not as large as business days. The company, about the middle of December, 1913, occupied a fine fireproof concrete garage that was built at 527 Rutherford avenue, but until then, because of the almost constant use made of the machines, they were seldom housed, but three of them were kept at Somerville, and the others were sheltered in whatever place was convenient.

From the Charlestown station the distances to the branches are as follows: Forest Hills, eight miles; Lynn, 10 miles; Salem, 17 miles; Bemis, nine miles; Brookline, six miles; Medford, five miles; South Bos-

ton, Malden and Chelsea, four miles.

Considering these for a moment, it will be seen that with the original branches at Forest Hills, Malden and Chelsea, the hauls were eight miles for the first, and four miles for each of the other two. To supply Forest Hills branch it was necessary to use four four-horse wagons, each carrying a load weighing from six to seven tons, and to haul the Malden branch stock one four-horse wagon and one two-horse wagon were required, the load averaging about eight

tons. A round trip to Forest Hills was a day's work for a horse team, and because of the conditions the horses making the Malden haul could do other work. But as the time in which the work could be done was limited no economy could be made in the number of horses and wagons used.

The distribution of milk in bottles from the plant to the branches or from the branches to the retail customers means that following a full delivery the return is made with about 60 per cent. of the weight, for the cases and the empty bottles collected or handled will average about that proportion. This applies to the route deliveries as well. Not including the routes served from the Charlestown plant, the stores, or the wholesale customers, and considering only the branch business, approximately the following tonnage is hauled by the trucks and the Autocar wagons: Forest Hills, 25; South Boston, 19; Brookline, 10; Malden, 12; Medford, nine; Chelsea, 13; Lynn, four; Salem, 1.5. This statement does include the Bemis branch, but shows that the haulage to the stations specified is approximately 92 tons.

Branch Service of Vital Import.

Time is an important factor, for the distribution is begun each morning at 1 o'clock, and for this reason, and to have the milk as fresh as possible, bottling is begun as the cars are received and it is continued through the day and evening. The trucks are started on the first trips to the branches at 4 in the afternoon, and they are worked until about 2 o'clock in the morning freighting to the branches, the last trips carrying products for the latest department route wagons.

This work is distributed in part in the following manner: To Forest Hills, one five-ton truck makes three trips and the 6.5-ton truck one trip, while the last load is taken by a machine that will carry whatever is required, this being either a four, five or the 6.5-ton machine. The 6.5-ton truck makes three trips to South Boston. A five-ton truck makes two trips to Brookline. A four-ton truck makes three trips to Malden. A five-ton truck makes three trips to Chel-

sea. A 3.5-ton truck makes three trips to Medford. The work to the other branches is somewhat dependent upon requirements. Autocar wagons are stationed at Lynn, at Salem and at Forest Hills, and a fourth is used in serving the South Market street store in Boston, and two other Autocars are used for special deliveries and general emergency work. The Salem machine comes to Charlestown each night and hauls the supply over the road, and that from Lynn comes to the plant an average of four times a week, for about four tons freight is sent to Lynn daily.

Freight Haulage Besides Delivery.

But in addition to the direct branch haulage the machines are required to make deliveries to the stores, to the wholesale customers, to deliver, in addition to the cases of bottled milk, cream and buttermilk, the butter, cheese, eggs and condensed milk, and to do freighting of hay and grain and supplies of all kinds. To illustrate, the five-ton truck in the regular Forest Hills branch service makes an average of 72 miles daily, one man driving it to Forest Hills, and another taking it for the freight work. The 6.5-ton truck serving South Boston is driven 40 miles a day. The five-ton truck doing the Brookline haulage also makes one or more trips to the milk bottle exchange and has one or more loads in this work, averaging 32 miles a day. The four-ton machine hauling to Malden is worked with a double shift, the second man driving it 26 miles on two wholesale routes and a North station trip, the total work being about 51 miles daily. The 3.5-ton truck worked between the plant and the Medford station makes four trips to the company's stores and in addition is worked on freight and wholesale trips, this having a total mileage of 58 miles, and the five-ton truck serving the Chelsea station is worked an average of 70 miles a day, of which but 24 is between the plant and the branch. One three-ton truck is ordinarily used for general work, not having a regular assignment, but this is driven about 25 miles a day in ordinary service.

The Autocar attached to the Salem branch is driven 60 miles a day, that machine at Lynn is worked 40 miles, that at Forest Hills 35 miles, and that at the South Market street store 40 miles, and the other two in special delivery vary from 50 to 75 miles, according to the requirements. When circumstances have required machines have been worked continuously for 24 hours with three shifts of men, and seven days a week. Sunday is the day of least work of the week, for there are no company stores or wholesale customers to serve, freights are not carried and

the bottle exchange is not open, but the distribution of milk to families must be made from the branches, and the demand is always heavier Monday because of the diminished supply from the Sunday consumption. In addition to this the Monday distribution is large because of the general replenishment of the stocks of the stores, and the greater general demand.

All the additional work must be done by the trucks. The reason for this is obvious. The branches are supplied with whatever is required to meet demands, but stock must be hauled from the Charlestown plant. Shipments cannot be made by railroad direct to the branches because of the conditions obtaining. Preparation of the products can be made more economically at Charlestown, but the branches must be located conveniently to the centres of patronage because of the route distribution, for which horses have been used, for a great deal depends upon the service that can be afforded, and the possibilities for competition must be considered.

Branches Dependent on Patronage.

It must be understood that a considerable volume of patronage is necessary to justify the location of a branch, and when established a great deal of attention is devoted to promotion and development of custom. There is a limitation to the time of delivery in the morning, and distribution cannot be begun too early, especially in the warm weather, because of the necessity of keeping the milk and cream cool. The volume of business increases with the spring and summer months, and the work is proportionate to this increase. Horses have been used for route distribution, as the stops are very frequent, the customers often close together, and as the bottles must be carried into the houses in many instances, or left where they are not exposed to theft, and the empty bottles must be collected, much of the work of the drivers is going to and from the wagons. The animals become educated to the work and many of them will follow a driver, or obey commands, so that delivery is facilitated, but a motor vehicle could only be used by re-



The Fireproof Concrete Garage Building, Completed Last December, and Planned for Expansion by Constructing Additional Stories.

turning to it after each delivery, starting the engine (if this had been stopped), and the short distances between stops are frequently such that there is a great deal of doubt as to the economy that is practical with them.

Use of Machines for Route Delivery.

The company is working out Autocar delivery at Salem, however, which will probably determine the possibilities very accurately. The first machine was placed in service in that city in 1912, this serving a route of shore customers, carrying a full load and making retail distribution. Last year a second machine was sent out to a second route, and this spring a third will be used, and from these the company expects to obtain some very definite facts. These routes, however, are much longer and are not comparable as a rule with those from the branches, for one of them will extend to Gloucester, which is a much longer distance than could be worked successfully with animals.

One possibility is that of serving a greater number of customers, because of the larger capacity of the machines, both as to load and mileage, as compared with horses, and by working two men on them instead of one, as is now the custom. The use of these machines the coming summer is expected to result in some very practical information. The routes as a rule are longer than those served by horses, and the loads carried are larger.

The actual work of the trucks is begun daily at 4 o'clock in the afternoon, when the first loads for the branches are taken out, and from that time until the next morning, and possibly until noon, the haulage is continued. As might be assumed, the volume of freight for a concern of the proportions of Hood & Sons is very large, and it is increasing constantly. The company trains its own drivers, preferring to take inexperienced men and teach them to employing those who have gained their experience in the service of others. Aside from replenishing the fuel, water and oil tanks, and oiling and greasing the exposed working parts, the drivers have no work on the machines. All else is done by the garage force, and the machines are constantly observed by the superintendent of the motor vehicle department.

Some Facts as to Operating Cost.

The garage is a model, of concrete and fireproof, and designed by the addition of one or more stories in the event of need. It is 42 by 112 feet, with two main entrances from Rutherford avenue, and the main floor is clear, the superintendent's office being between the entrances. At the rear is a repair shop, separated by a heavy wall and a fireproof door, and this is also accessible for vehicles by a rear door. The shop has an equipment of floor crane and machine and hand tools to make practically all repairs, and there is a stock room where a supply of spare parts and material is always available. Spare wheels for the trucks and wagons, with and without tires, are ready for use when needed, and should a machine be delayed from failure or breakage, the driver telephones

the garage and men are sent who will make a repair. If repair is impossible another machine is sent to take the load. As care is taken to have the machines in good condition at all times they are seldom delayed from any cause, and not for two and a half years has a vehicle been towed in. Daily inspection means a great deal and does much to minimize maintenance.

Because of the work that each machine does the cost of operation is relatively smaller, for the reason that the fixed charges are not increased with additional mileage, and the operating expenses are not doubled, these being the items of wages, fuel, lubricants and repairs; but the overhead expense, the depreciation, taxes, interest, insurance, storage, etc., are not increased. The operating cost is kept, this including gasoline, oil, repairs (which include all labor), parts and tires, and to this is added each driver's wage. The machines are washed and cleaned daily and are extremely well kept, despite the continuous service. The depreciation is computed on a three-year basis. The work done by each machine is recorded and the cost is established, this being slightly in excess of the operating expense, but no attempt is made to compare the same service with the cost of animal haulage, for a good part of this would not be practical.

Last summer an experiment was tried for a month, that of sending the 6.5-ton truck to Lawrence daily, but this was not continued because it was not believed that the work was as economical as other service for which the machine was available. The truck hauled a load averaging seven tons to Lawrence, and returned with a load of empty bottles. The haulage has been since that time considerably shorter distances, Salem being the longest trip that is made up to the present time.

CITIZENS' TRAFFIC COMMITTEE.

The Citizens' Street Traffic Committee of Greater New York has been permanently organized by the election of the following officers: President, Robert Grier Cook, Fifth Avenue Association; treasurer, G. H. Pride, Motor Truck Club of America; secretary, Elmer Thompson, Automobile Club of America; executive committee, the three officers named and R. W. Meade of the Fifth Avenue Coach Company and S. W. Taylor of the Uniform Motor Vehicle Legislative Commission. A petition has been presented to Mayor Mitchell and Police Commissioner McKay asking that a deputy police commissioner be appointed to have direction of the regulation of street traffic. The organization as completed is to continue for one year and the committee will meet every alternate week in regular session. As stated, the purpose of the committee is to assist the police department in every way that will bring about improved conditions.

The statement is made that the Rutenber Motor Company, maker of motor vehicle engines, is to establish a branch plant at Berlin, Ont.

TWO NEW WATER-COOLED CHASE TRUCKS.

THE Chase Motor Truck Company, Syracuse, N. Y., which has for years built light weight motor vehicles of the wagon type, using large wheels and small tires, with three-cylinder, two-cycle, air-cooled motors as standard power plants, has, because of the demand for machines which will carry heavier loads, and have lower centres of gravity, and for engines that are regarded as more conventional, added to its production two machines of 3000 and 6000 pounds capacity. The Chase company will, however, continue to produce the standard types such as it has built for seven years in the smaller sizes of vehicles, and will build the new models in such numbers as may be required to meet the demands of those who desire its machines.

The smaller of the two is built in two chassis lengths, 146 and 160 inches, the longer being produced only to order and the shorter being the standard stock model. The tread is 58 inches. The motor is a Continental model C, a four-cylinder, water-cooled, L head type with the cylinders cast en bloc, having cylinder bore of 4.125 inches and stroke of 5.125 inches. This engine has an S. A. E. rating of 27.2 horsepower, but is claimed by the maker to develop 30 horsepower under practically any condition of normal operation. The cooling is by a circulation of water through a radiator of generous proportions, and the lubrication is by a positive plunger pump system with constant level of oil in the crankcase, one lead of tube flooding the timing gears and another the rear main bearing, the other moving parts of the motor being lubricated by splash. The ignition is by a Bosch DU4 magneto with automatic spark advance. The engine is governed to 1250 revolutions a minute by a governor that is set and sealed at the factory and cannot be changed without the knowledge of the owner.

The clutch is a multiple disc type, and the transmission gearset is a three forward speed and reverse selective construction that is assembled with the jackshaft, the assembly being mounted on three points to avoid the stresses of chassis frame distortion. The gear ratios are designed to give speeds of 15.6, 8.5 and 4.5 miles an hour respectively in forward movement, and 3.5 miles an hour in reverse. The design of the gearset is such that but one driving gear may be engaged at any given time.

The chassis frame is a pressed steel channel section that is mounted on

semi-elliptic springs, the rear springs under-slung, the front axle being an I section and the rear axle a rectangular section. The wheels are 36 inches diameter, the forward wheels being shod with 36 by four-inch single tires and the rear wheels with 36 by three-inch dual tires. Both brakes are operated by pedal, the service brake having shoes expanding in drums on the rear wheels, and the emergency brake bands contracting on the same drums. The loading space of the standard chassis is 109.5 inches length and 48.5 inches width, and the length of the chassis is 205 inches. The machine is left side driven and the control levers are in the centre.

The three-ton machine is designated as model O and this is driven by worm and gear wheel, having a gearset that affords four forward speeds. The motor is also a Continental model E, this being a four-cylinder, water-cooled, L head construction with the cylinders cast in pairs. The cylinder bore is 4.5 inches and the stroke is 5.5 inches. The motor is given an S. A. E. rating of 32.2, but the maker claims that it will develop 40 horsepower in normal conditions of service. The engine is cooled by water circulated through the water jackets and a large radiator by a centrifugal pump, radiation being promoted by a belt-driven fan. The radiator is mounted on springs and may be quickly removed when necessary. The lubrication is a positive plunger pump and constant level splash system, the oil being drawn from a reservoir and supplied to the timing gears and rear main bearings, the overflow filling the pits into which the ends of the connecting rods sweep. The oil is circulated through a sight feed glass on the dash. The valve mechanism is enclosed to protect the working parts. The ignition is by a Bosch DU4 magneto fitted with automatic spark advance. The motor may be governed to any desired speed by a sealed governor. The dry plate clutch and



The Model O Three-Ton Chase Truck, This Having a Water-Cooled Motor and Being Driven by a Worm and Gear Wheel, There Being No Radius Rods.

the four-speed Brown-Lipe transmission gearset are assembled in a unit with the motor. The high speed ratio of the gearset will drive the machine 15 miles an hour. The direct drive is on the third ratio.

From the gearset the drive is through a propeller shaft in which are two universal joints, to the Sheldon designed rear axle, in which the worm and gear wheel are the David Brown type. This axle is constructed to carry 80 per cent. of the load and has a large margin of safety. The frame is a channel section of pressed steel having a width of 6.5 inches and depth of 5.5 inches, .25 inch thickness. This is well braced and has three cross members that insure ample strength. This is mounted on semi-elliptic springs, the rear set being underslung. The forward axle is an I section. The wheels are fitted with 36 by four-inch single tires forward and 36 by four-inch dual tires rear.

The drive is at the left side and the speed changing lever is at the centre. Both sets of brakes are pedal operated and act on rear wheel drums, the service brake shoes being of the internal expanding type, and the emergency brake bands external contracting.

The wheelbase is standard at 148 inches, but can be furnished when desired at 165 inches length. The tread is 62 inches. The standard chassis length is 218.5 inches and this allows a body with loading space 122.5 inches and width of 52 inches. The special chassis gives 20 inches additional length. As designed the chassis weight is equally distributed on the four wheels, but when loaded 20 per cent. of the freight is carried by the forward axle. When desired other gear ratios can be given the worm and gear wheel and higher or lower speed obtained.

MOTORISTS WANT GOOD OILING.

A five-ton Garford chassis, equipped with a 1000-gallon tank and apparatus for applying oil uniformly under pressure, has been ordered by the Automobile Club of St. Louis, Mo., and this will be given to St. Louis county with the understanding that the county shall operate it and oil the principal highways. The chassis will have the best equipment and is expected to be serviceable for a number of years. The club will spend \$10,000 in road oiling, and the purchase of the machine represents a considerable part of that sum.

MOTOR TRUCK PUBLIC SERVICE.

The plans for a public service that has been established between Mason and Brady, two Texas towns, are unusually ambitious, and if the proposition of the people of the town communities is realized a road with good surfacing will be built by McCulloch and Mason counties for the use of these and other motor vehicles. Passenger omnibuses are operated on schedule time between the towns, and shortly trucks will be used to give regular freighting service.

NOW THE MOTOKART COMPANY.

The MotoKart Company, with capital of \$500,000, has succeeded to the business of the Tarrytown Motor Car Company of Tarrytown, N. Y., with capital of \$250,000, and the Steinbock Engineering Company of Peekskill, N. Y., taking over the business of the two concerns March 2, the executive offices being continued at 1790 Broadway, New York City. The officers of the new company are announced as follows: President, A. R. Gormully; vice president, H. E. Steinbock; sales vice president, G. C. Wolfe; treasurer, B. J. Knerr; secretary, E. M. More; purchasing agent, F. C. Sievers.

Until the date stated the two plants were operated independently, the engines, transmission gearset, axles and other mechanical parts being built by contract by the Steinbock Engineering Company, and the frames, bodies, wheels and fenders being made at Tarrytown, where the vehicles were also assembled and painted. Both factories are now producing the same work as before, both being worked exclusively for MotoKart construction.

The MotoKart Company has planned a very aggressive publicity and selling campaign and it has systematized its manufacturing so as to meet a very general demand for its machines. The MotoKart wagons weigh 900 pounds and have capacity of 400 pounds. They are compactly built, with wheelbase of 69 inches and tread of 44 inches, this making for easy handling in all conditions of operation and requiring very small storage space. The company has issued a new catalogue in which are illustrated the box and open types of bodies with which the chassis are equipped, either of which is furnished at the same price. Copies will be sent to any person at request.

REPUBLIC TRUCKS IN DEMAND.

The business of the Alma Motor Truck Company, Alma, Mich., builder of Republic 2000-pound delivery wagons, has been excellent, and the prospect is exceedingly satisfactory, according to statements made at the annual meeting of the company. One probability is increasing the plant to afford sufficient facilities for production. Francis King was elected president, and E. W. Ruggles vice president and general manager.

PEERLESS OFFICERS ELECTED.

The stockholders of the Peerless Motor Car Company, Cleveland, O., at the annual meeting, elected the following officers: President, L. H. Kittredge; vice presidents, E. H. Parkhurst and Theodore C. Frech; treasurer, H. A. Tremaine; secretary, George B. Siddall. J. B. Crouse retired as vice president and F. S. Terry as director, their positions being filled by the election of Mr. Frech to both, but they have not relinquished their holdings of stock.

CO-OPERATIVE DELIVERY.

A plan of co-operative delivery has been inaugurated at Paxton, Ill., which will be worthy of the observation of those doing a small business that requires constant distribution to customers. A number of butchers and grocers of Paxton have made agreement with James Wolfe and David Johnson, who have purchased three motor delivery wagons and will undertake the delivery for these stores at a stated price on a package basis. The three trucks are expected to do more work than 10 single-horse wagons in a stated period of the day, and that there will be considerable economy resultant for each concern, as well as eliminating the responsibility to a large degree.

OPERATES 84 WHITE MACHINES.

With the acquisition of three 3000-pound White wagons recently the Atlantic Refining Company, which is the leading distributor of petroleum oil products in western Pennsylvania, now has 84 machines of that make and of different sizes in its service. The company has utilized machines for a considerable time and with the establishment of each new station uses one or more to make distribution, for the service afforded its customers has been a very practical reason why its business has been materially developed, and the deliveries have been extended over areas that could not be served with any other equipment.

EXPORT TRADE WITH RUSSIA.

The Russian trade division of the National Association of Manufacturers has organized a series of open meetings at the headquarters of the association at 30 Church street, New York City, with Hon. C. J. Medzikhovsky, commercial attache of the Russian embassy at Washington, for the purpose of fostering trade with Russia. The first of these, April 1, was devoted to the consideration of exportation of agricultural machinery, traction engines and heavy trucks, and that to be held April 23 will be given over to the prospects for exporting passenger cars. These meetings are intended to promote trade in numerous lines.

NEW FEDERAL VICE PRESIDENTS.

The board of directors of the Federal Motor Truck Company, Detroit, Mich., has elected Galvin B. Denby, secretary and treasurer of the company, and M. L. Puicher, its general manager, to be vice presidents. They will continue as such in the offices which they previously filled.

The Gramm-Bernstein Company, Lima, O., has just issued a new catalogue, which is descriptive of the four sizes of B. A. Gramm's trucks built by this concern.

ADVERTISING WITH MOTOR TRUCK.

Those using motor vehicles can consistently develop advertising possibilities with them at comparatively small expense, for in regular service the machines are generally driven many miles daily, passing within the observation of many people. As a matter of fact few motor wagon or truck owners realize what can be accomplished by carrying appropriate advertising signs on the machines. It is well enough known that a truck would not attract attention while passing through the streets unless carrying an unusual load, but as trifling an object as a flag or pennant would be noticed by hundreds, if not thousands.

For this reason signs that are comparatively inexpensive and can be changed frequently, of sufficient proportions to be easily read at a distance, can be used to material profit. Of course where appearance is valued there are those who depend upon the finish of the machine to attract observation, but where results and not permanent ornamentation are regarded the cheap sign that will be useful for several days, and can



Advertising Possibilities Developed by John D. King, Poughkeepsie, N. Y., Dealer in Motor Vehicle Supplies.

be replaced by another in a short time, will insure practical returns.

An instance of this character is the vehicle owned and used by John K. King of Poughkeepsie, N. Y., who is a dealer in motor vehicle supplies. He specializes in what he knows will interest owners and drivers of wagons and trucks and has become known in a business way to practically all residents of the city in which he is located. This form of publicity is legitimate and has been very productive.

In the list of specifications of electric vehicles published in the March issue of **MOTOR TRUCK**, a typographical error caused the price of the five-ton chassis built by the Commercial Truck Company of America to be stated as \$9535, when the correct price is \$3935.

Work has begun on the erection of a three-story addition to the plant of the Kelly-Springfield Tire Company at Akron, O., which will cost about \$20,000.

ECONOMY OF FREIGHT HANDLING.

Possibilities Through Special Equipment for Limited Haulage Service.

Those who have haulage to do often disregard the possibilities to be obtained by special equipment for quick handling of vehicle freights, believing that the expense entailed does not justify the construction of what may assumedly be needed for a comparatively short time. The supposition is that unless a work is continuous or of considerable duration expense in connection with it is needless, and the saving that might obtain would not warrant equipping it so that labor and time may be minimized.

An example of the possibilities, however, and of the good judgment that was used, may be found in the case of J. F. Kulp & Sons, Buffalo, N. Y., a concern that owns four Pierce-Arrow five-ton trucks, and which had contract for hauling all the marble to be used in the construction of the new Catholic cathedral at Delaware avenue and Utica street, in that city. The building is to cost \$1,500,000 and the edifice will include 590 carloads of marble, about 450 of this to be for exterior and about 140 for interior work.

The stone could be easily defaced and for that reason could only be handled carefully, and when the haulage was begun much time was lost in loading at the cars and unloading at the site. Cranes were used at the cars and the unloading was by hand, each piece being handled separately. To economize, a number of "skips" or shallow boxes were built, these being mounted on small wheels so that they could be moved readily and quickly, and at the building site a platform was made with a runway to the ground. From the run plank ways were laid when necessary.

Some of these "skips" were left at the cars and these were loaded by the cranes when the trucks were

moving. The trucks carried the "skips" and the loads to the cathedral, where they were pushed on to the platform and they were left for the workers to handle at convenience, and empty "skips" were taken back to the cars. On arrival the empties were unloaded, loads quickly placed and return made without loss of time of the truck or of the men at either end. The breakage was reduced to practically nothing, and all delays were avoided. One truck in a nine-hour day hauled between 50 and 55 tons of marble, the round trip averaging about eight miles.

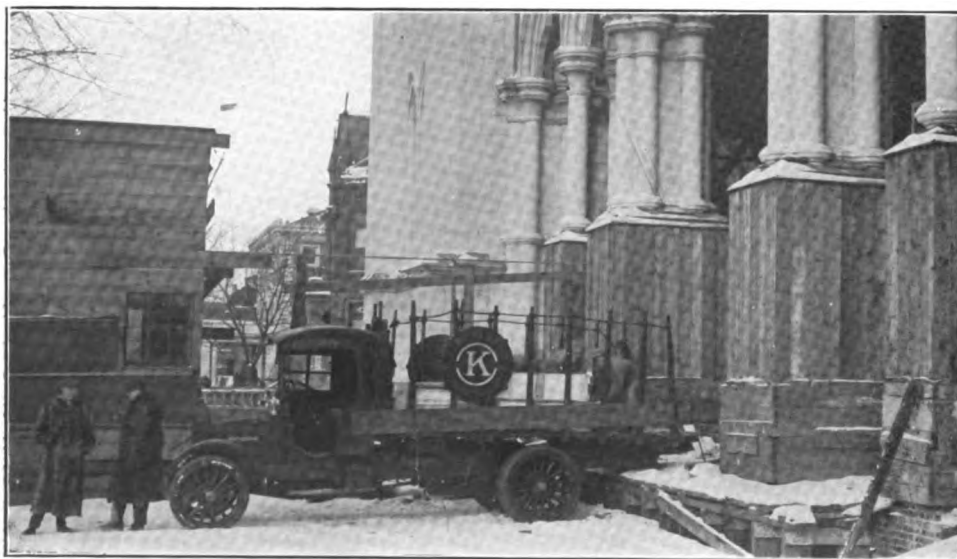
JERSEY ABANDONS NEW FEE BILL.

The bill that has been pending in the New Jersey legislature providing for the licensing of motor vehicles by classification of weight and horsepower, which was introduced at the instance of Governor Fielder, and which was expected to increase the revenue of the state approximately \$500,000, has been withdrawn, and there is little probability that a substitute will be presented. According to the bill the pleasure cars were divided into three classes by weight—not exceeding 2000 pounds, more than 2000 and not exceeding 3000 pounds, and more than 3000 pounds—and five classes by horsepower, where the weight was less or exceeded the above ratings with the standards of 22 horsepower, of more than 22 horsepower and less than 36, and for 36 horsepower or exceeding it, the fees being 50, 60, 70 and 80 cents and \$1 a horsepower. The bill provided that freight vehicles weighing more than 4000 pounds should pay \$2 additional.

MOTOR TRUCKS BUILDING EXPOSITION.

The work of constructing the grounds and buildings for the Panama-Pacific International Exposition, now progressing at San Francisco, Cal., and which has considerably advanced, has been thus far accom-

plished without the use of horses for haulage, and there is little probability that animals will be utilized for any purpose in connection with the development of the site or the structures upon it. There are numerous railroad sidings that reach the grounds, but the material must be moved from the cars, to say nothing of what is received at the piers in the city, and all of the haulage has been done with motor trucks. This is probably the first undertaking of such proportions, and certainly the first international exposition which was constructed without the use of animals for haulage.



Pierce-Arrow Five-Ton Truck Used with "Skips" for Hauling Marble for a New Cathedral at Buffalo, N. Y.

THE SIGNAL 1500-POUND DELIVERY WAGONS.

SPECIALIZING on a single type of vehicle that is believed will meet the requirements of the greatest number in need of highway transportation equipment, it being a unit of a size that is regarded as most practical and useful, the Signal Motor Truck Company, Detroit, Mich., has developed a 1500-pound delivery wagon chassis that, while conventional in every detail, is designed to afford maximum service at a minimum operating expense. Regarded from any point of view the Signal machine is not an untried construction. It is built of components that can be considered the best development of the industry, being produced by some of the largest and most responsible manufacturing concerns identified with vehicle building, and these products have been proven by continued service to be enduring and equal to every demand made of them.

Instead of following experimental development the company decided to build one size of machine from units that had been established as standards, and with this purpose its engineers selected those products that were recognized for their quality. One

reason for this was that besides

the attention the company can give, the owners of these machines have at their command the resources of the makers of the units, which insures to them service that is certain to continue and at comparatively small expense. This policy means the production of machines that, while sold for a moderate price, are constructed of high quality material, and, concentrating on a single type, the production cost is minimized—two important considerations for the purchasers.

The Signal wagons are assembled by a factory organization that is extremely efficient. Unusual care is taken that every machine produced will be up to a high standard. In the completed chassis are found Continental motors with Eisemann ignition systems, Hartford clutches, Covert transmission gearsets, Russell jackshafts, Detroit springs, Timken front and rear axles, Gemmer steering gears and Hyatt roller bear-

ings, which have been selected of proportions to have extremely high factors of safety, and the assemblies are well harmonized and have excellent appearance.

Emphasis may be made that nothing experimental has been accepted, and standard practise has been followed, but endeavor has been made to have a construction that is balanced throughout and that is accessible.

Features of the Motor.

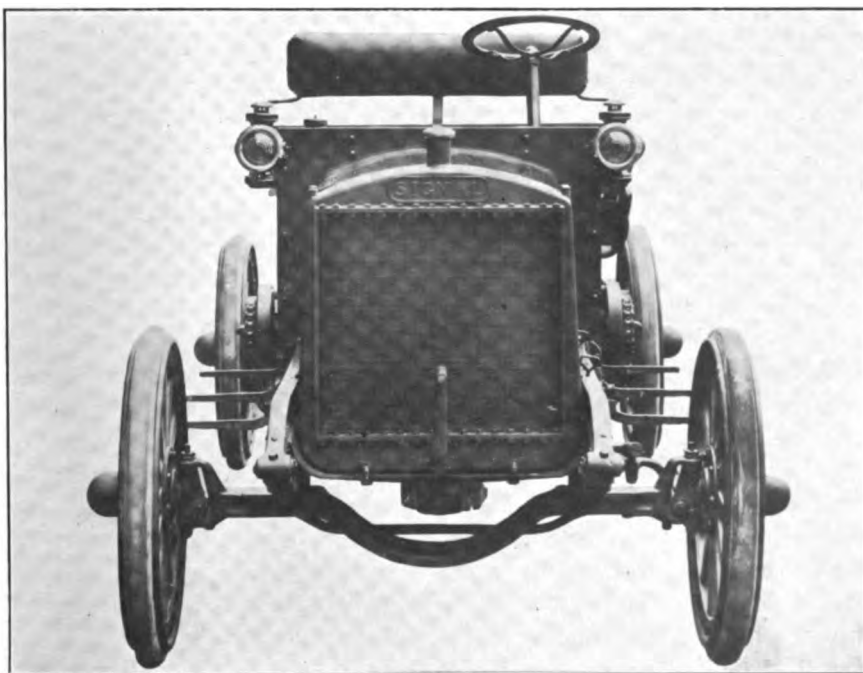
The motor is a four-cylinder, water-cooled, vertical L head type, with the cylinders cast en bloc, with cylinder bore of 3.75 inches and stroke of 5.25 inches, mounted under a hood. The motor has a rating of 22.5 by the S. A. E. standard, but is claimed by the maker to develop more than 30 horsepower by brake test.

The construction is with ample factors of safety and all parts have liberal proportions. The block is cast with a large water jacket head that insures freedom of water circulation; the crankcase is an aluminum alloy, the lower half containing the oil reservoir and the upper section carrying the main bearings; the pistons have four rings and five oil grooves; the wristpins oscil-

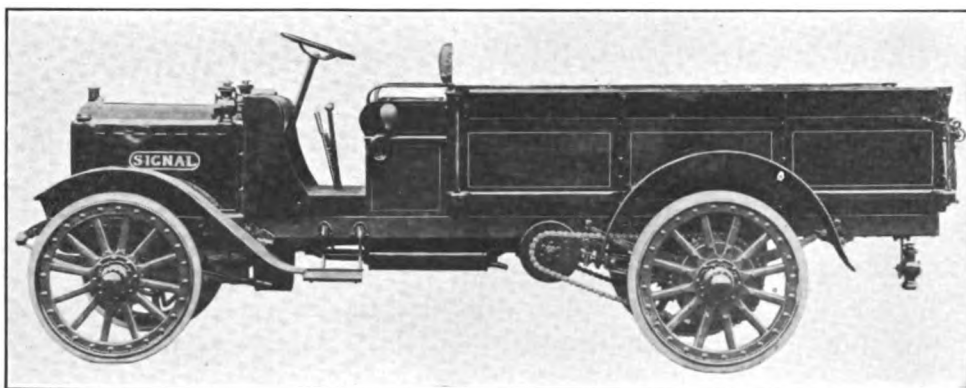
late in bosses in the piston walls; the connecting rods are I beam construction; the camshaft is forged with the cam integral and carefully hardened and ground; the crankshaft has large bearings and the crankpins are ample, and flanges insure against end thrust; the timing gears are helical to eliminate noise; the bearings are nickel babbitt specially fitted, with steel shims for the connecting rods; the valve ports are large and the valves have full clearance, with nickel steel heads and carbon steel stems, electrically welded, and operated by tappets of the mushroom type; the valve mechanism is enclosed by two easily removable plates.

Lubrication and Cooling.

The motor is lubricated by a force-feed constant level system, the oil being drawn from the reservoir through a filter in the base by plunger pumps driven



Front View of the 1500-Pound Signal Wagon Chassis, Showing the Built-Up Radiator and the Generally Sturdy Construction.



Side View of the Signal 1500-Pound Wagon Chassis, Equipped with Open Express Body, This Being a Standard Equipment.

by eccentric on the camshaft. The lubricant is forced through a copper tube to flood the timing gears and the rear main bearings, and then drains to the crankcase, where it is distributed about the interior of the engine case by the sweep of the connecting rods. The oil reservoir can be drained and the filter cleaned conveniently. The engine is cooled by a circulation of water through the jackets and a large radiator of the built-up truck type, the centre section being fitted with finned vertical tubes, and the head and base and the side columns are castings from motor cylinder iron. The centre section is retained by a series of bolts and can be easily removed. This radiator is mounted on the dropped front cross member of the frame and is not affected by the weave of the frame. The water is circulated by a double-bearing type of centrifugal pump and radiation is assisted by a ball bearing fan mounted on an adjustable bracket, driven by a flat belt from an extension of the water pump shaft.

The ignition system consists of an Eisemann high-tension truck type magneto that is installed with a fixed spark, and the cable leads are protected by fibre conduits. The carburetor is an automatic float feed type that is claimed to supply a satisfactory mixture at all operating speeds. The fuel supply is controlled by a hand lever on the steering wheel and a foot accelerator. The motor is fitted with a centrifugal type governor which limits the speed of the vehicle on the highest speed ratio to 18 miles an hour. The fly-wheel is bolted to the rear flange of the crankshaft.

The clutch is a Hartford construction, being a cone of pressed steel 15.75 inches diameter with 2.625 inches face, with leather facing. The clutch has capacity to transmit 45 horsepower. Beneath the leather facing are six flat adjustable springs that insure easy engagement. Both the spring load and the declutching stress are taken by the highest grade of ball thrust bearings, these being

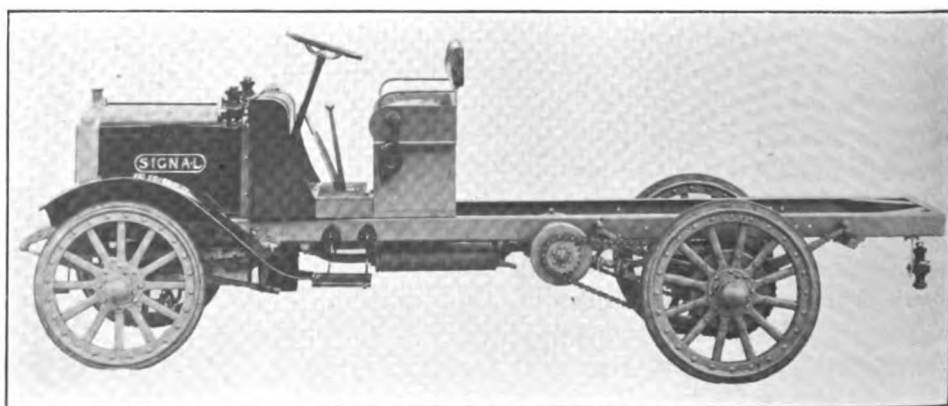
of the grooved type, with hardened and ground ball races. The declutching bearing is housed in a grease tight case, which does not revolve save when the clutch is disengaged, this minimizing the wear usually imposed upon bearings. The driving shaft is a Hartford product, 1.375 inches diameter, of alloy steel, with block and trunnion type joints, the trunnions, blocks and couplings being hardened and

ground and housed in grease tight cases.

The transmission gearset is a Covert design and construction, selective in its operation, having three forward speed ratios and reverse, the third or high ratio being direct through jaw clutches. The gears and shafts are of 3.5 nickel steel, the gears being carefully cut and the shafts ground and heat treated. The main and countershafts are mounted on Hyatt high duty roller bearings and the stub end of the main shaft is carried on a Standard roller bearing. The bevel pinion of the main shaft is backed by a grooved plate type ball thrust bearing. The gearset is assembled in combination with the jackshaft, and a torque arm is carried forward from the gearset case to the centre cross member of the frame, the forward end of the arm being spring supported.

Jackshaft and Axle Construction.

The jackshaft is a Russell production and is specially designed for heavy duty truck service, the gears and shafts being of heat treated nickel steel. The differential and the shafts are mounted in Hyatt high duty bearings, the thrust of the bevel or ring gear being taken by grooved plate type ball thrust bearings. The jackshaft floats in hangers rigidly fastened to the frame side members, and has a universal action in these hangers, rocking in unison with the movement of the torque arm of the transmission gearset casing. The jackshaft sprockets are of high carbon steel and are case hardened. They are easily removable when replacement is necessary.



The Signal 1500-Pound Wagon Chassis, with the Regular Equipment, Before the Installation of a Body.

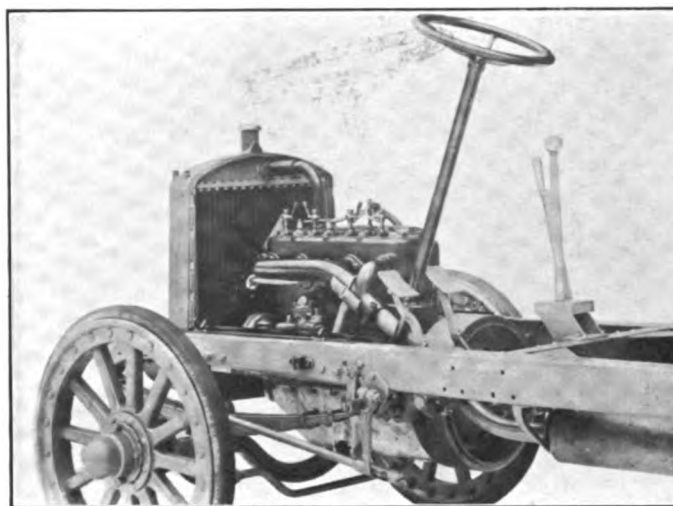
The front and rear axles are Timken construction, heavy duty truck types, and are made of high carbon steel, heat treated. The front axle is two by 2.75 inches, and the rear axle 1.75 by 2.5 inches, the front being an I and the rear a rectangular section. The spindles of the front axle are 1.9375 inches diameter at the inner bearing and 1.375 inches diameter at the outer bearing, and the spindles of the rear axle are two inches diameter at the inner bearing and 1.625 inches diameter at the outer bearing. The axles are fitted with Timken roller bearings and hubs, the hubs having bolted on steel hub caps.

Frame and Spring Detail.

The frame is constructed from pressed special alloy steel channel section, .1875 inch thickness, 4.5625 inches width and varying in depth from 1.75 inches at the motor arms to 3.75 inches at the centre cross member, and to 2.5 inches at the rear end. The forward end of the frame is "necked" to decrease the turning radius. Both the centre and the rear frame cross members are 2.5 inches width and the full depth of the side members, being reinforced by unusually large gussets at both top and bottom.

The frame is suspended on springs made by the Detroit Steel Products Company, of special alloy steel and designed for truck service, which are fitted with a patented lubricating device. The front springs are 44 inches length and 2.25 inches width, and the rear springs are 50 inches length and 2.5 inches width. The spring eyes are bushed with phosphor bronze and grease cups are fitted. Hardened and ground bolts carry the suspension shackles, which are free to oscillate. The rear end of the frame is carried well down inside the springs, resting on heavy round cross bars that are extended through the lower ends of the spring shackles, this construction lowering the body and loading platform, as well as minimizing side sway. The minimized motion is an important factor where large bodies are used. The springs are secured to the axles by heavy clips bent over semi-circular spring saddles, this eliminating right angle stresses, the clips being held by double nuts.

The radius rods are heavy, open I section steel castings that have practically a universal action.



Forward End of the Signal Chassis, Without Dash or Footboards, Showing the Motor and the Control Pedals and Levers.

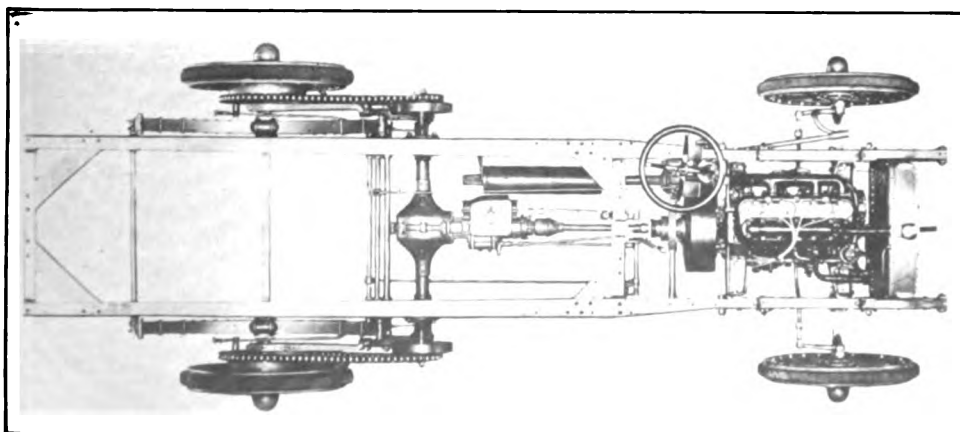
These rods are adjustable at the forward ends by a link threaded at either end that is retained by clamping bolts. The rear end is pivoted by a vertical pin to a brake carrier which is free to rotate on the rear axle, and the forward end is coupled to the jackshaft hanger by a spherical bearing and cap, so that there is no stress upon the rod, no matter what the movement of the springs or rear axle, aside from the driving thrust. The driving thrust of the radius rods is taken by the jackshaft hangers and the frame, and not by the jackshaft.

Wheel Equipment.

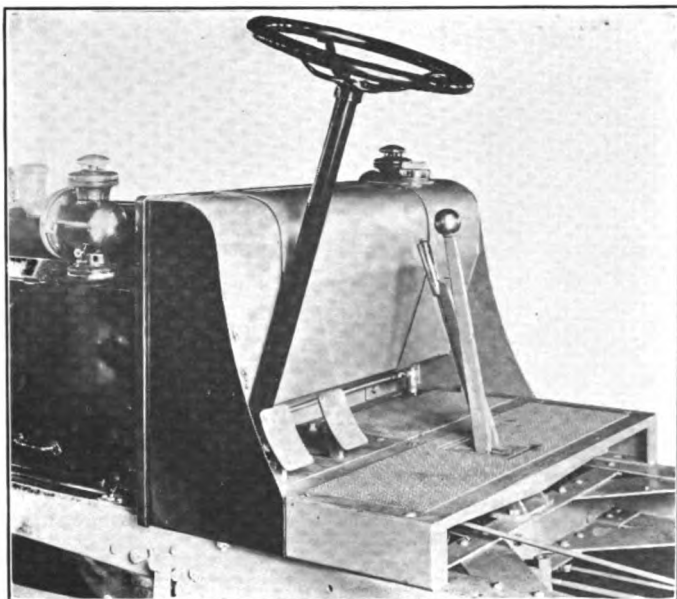
The wheels are made of selected second growth hickory, each having 12 spokes of 1.625 inches and 1.75 inches square section for the front and rear wheels respectively, with felloes designed to take the S. A. E. demountable rims. The wheels are equipped with solid band tires of the standard makes, standard demountable types, 34 by three inches forward and 36 by 3.125 inches rear. The drive from the jackshaft to the rear wheels is by chains of 1.25 inches pitch, .75 inch diameter of roll and .625 inch width between the side plates. The steering gear is a Gemmer design, this being a worm and full sector to minimize wear, operated by a 16-inch hand wheel. The gear is fitted with grooved plate type ball thrust bearings. The steering gear linkage is heavy and is carried behind the front axle to protect it against striking road obstructions.

Details of Control Members.

The machine is driven from the left side. The clutch pedal is at the left and the service brake at the right of the steering column. The fuel supply is by accelerator pedal. Applying the service brake automatically reduces the gas flow and the motor is reduced to



Top View of the Signal Chassis Without Dash or Footboards, Showing the Simplicity and Accessibility of the Operating Mechanism.



The Dash, Gasoline Tank, Footboards and the Operating Members of the Signal Chassis.

idling speed. The ignition requires no attention. The gear shifting and the emergency brake levers are located in the centre of the footboard at the right of the driver, with the shifting lever nearest, and the driver can enter his seat from either side without obstruction.

The brakes are of unusually large size and are of the internal expanding type, the service brake being on the jackshaft. The brake drums are 12 inches diameter and the shoes are 1.5 inches width, being faced with asbestos fabric. The brake drums are of steel. The braking effect is absorbed by the frame through the jackshaft hangers. The emergency brake shoes are mounted on the rotating carriers on the rear axle, are 2.5 inches width and 15 inches diameter, and expand within steel drums bolted to the wheels, which also carry the driving sprockets. These brake shoes are also faced with asbestos fabric. All brakes are cam actuated and are extremely effective.

With the governor set at 18 miles an hour the machine will make 12 miles on the second speed and 6.75 miles on low speed, the ratios being 7.5 to 1, 11.25 to 1 and 20 to 1, these indicating the difference in the propelling force on the low speed ratios. In designing the chassis care was taken to insure accessibility and convenience, and the gasoline tank is mounted back of the dash, with the filler cap at the right side, so that it may be filled from the step. The tank is well above the motor and there is a good flow of fuel to the carburetor on any grade the machine can climb. The shut off cock and the sediment trap are reached from in front of the dash. The arrangement of the tank insures warming the fuel

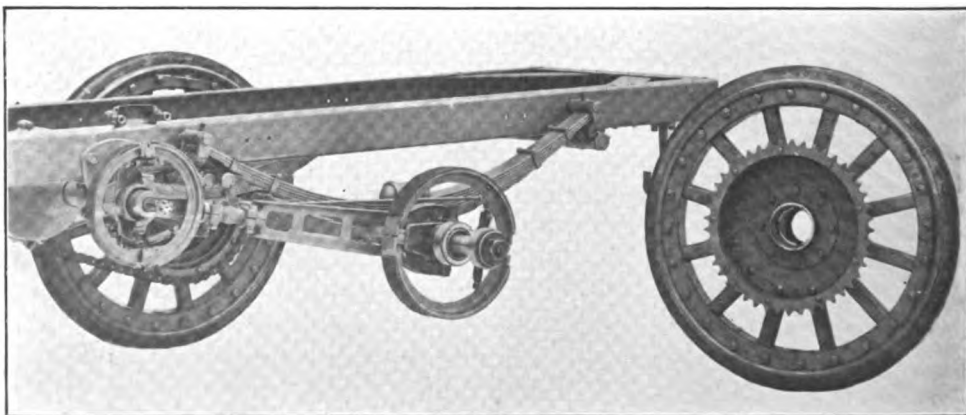
during cold weather, which is productive of greater operating economy. The standard equipment of the chassis is the driver's seat with spring cushion and upholstered back, front mudguards, running boards, dash and tail lamps and horn and tools.

The chassis as shipped has a priming coat of paint, but if ordered finished it will be painted to specifications. The wheelbase is 115 inches, with 56 inches tread forward and 60 inches tread rear, this design being to install a full sized body between the wheels. The truck can be turned without backing in a 34-foot street. With standard bodies the loading space back of the driver's seat is 96 inches length and 48 inches width, and the height of the platform is 32 inches above the ground. As the floor in front of the driver's seat is flat, when specially long space is desired an opening can be made so that loading can be done the full length between the dash and the tail gate, which is 138 inches.

TO PROTECT GARAGE OWNERS.

The Eastern Garage Keepers' Protective Association has been incorporated in New York City by Chester S. Walz of Glenbrook, Conn.; Thomas C. Walz of Pelham, N. Y., and John A. Samborn of New Rochelle, N. Y., which has been created by the same interests, and will be maintained with practically the same objects, as is now obtained with the Hotel Keepers' Protective Association. The association is to sell membership privileges, which will be good for a year, and during that period will supply its members with the names of all persons whose credit is known to be doubtful, this information being furnished by the members and distributed by the organization, which will serve as a clearing house. The cost of membership varies with the proportions of the business.

The H. J. Koehler S. G. Company, New York City, has appointed E. R. Marsters travelling representative for New England for the sale of the Koehler one-ton wagons. Mr. Marsters is well known in this section, having for five years been engaged in selling light weight machines in this territory.



The Rear Wheel and Jackshaft Brake Construction of the Signal Chassis, with the Timken Bearings Fitted to the Axle Spindle.

ROAD BUILDERS' CONVENTION.

The annual convention of the American Road Builders' Association will take place at Chicago in December, this place of meeting being decided from the fact that its location is accessible from all parts of the United States. In connection with the convention will take place a road congress, in which all organizations interested in road development will be asked to take part, and it is probable there will be a very extensive exhibition of road building machinery. The details of the convention will be arranged by George W. Tillson, E. L. Powers and R. A. Meeker, they constituting the executive committee of the association. One of the endeavors of the association and its committees during the present year will be to interest every national association devoted to road building and improvement to unite in a national convention annually.

SCHOEPF TALKS TO ELECTRIC MEN.

T. H. Schoepf, an engineer associated with Westinghouse Electric & Manufacturing Company, East Pittsburg, Penn., spoke at the monthly meeting of the Electric Vehicle Association of America, held at the rooms of the association at 29 West 39th street, New York City, his subject being "The Performance Characteristics of Electric Motors and Their Influence on the Operation of Electric Trucks". The meeting was largely attended and the paper was listened to with much interest.

TRAFFIC REGULATION WORK.

The work of the citizens' street traffic committee of New York City, to be carried on in conjunction with the police control of street use of vehicles, and in co-operation with different civic bodies, has been actively begun and promises to have very practical results. Committees have been appointed to study and investigate different conditions, and one headed by George H. Duck, president of the Motor Truck Club, is to examine and report on the size, weight and load of vehicles that should be permitted to use the streets of the city. Prof. Arthur A. Blanchard of Columbia University is chairman of a committee that is to study the needs and make recommendation of whatever additional legislation, either state or municipal, that will better regulate street traffic, and James K. Orr is chairman of a committee that is considering the bet-

ter means of removing snow from the streets of the Metropolis.

DETROIT DOGS RIDE IN STYLE.

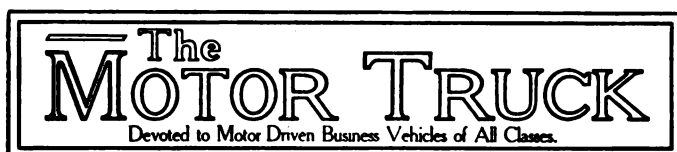
Detroit is regarded as the centre of motordom in that more machines are in use in proportion to population than any other city in the world. One reason that contributes to this result is the very large number of manufacturers of motor vehicles, accessories and equipment, and a good part of the residents not only are interested in the exploitation of motor cars, wagons and trucks, but the comparatively level country attracts through comparatively economical operating cost.

The Detroit municipal departments are practically all motor equipped, and this applies to some of the offices that would seemingly not have sufficient business to justify the purchase of special vehicles. For instance, the police department has just placed in service a new wagon equipped for the uses of the men who capture the stray dogs of the city, and this was designed with a view of economy as well as utility.

The machine is a Commerce 1000-pound delivery wagon chassis on which is installed an enclosed body that is partitioned with screens, making compartments in which a number of animals can be carried separately, whether or not vicious, without possibility of the creatures rioting and being disorderly, and from which they can be removed without probability of escape. The wagon is large enough to meet all requirements and it is much lighter than that formerly used, there being a considerable saving in operating expense. The machine has a cab in which the one man who drives it is well protected in cold weather and storms, and the body is sightly, despite the use made of the vehicle. The compartments are fitted with doors at the sides and end. The satisfaction obtaining with the first Commerce machine led to the purchase of the second machine of the same make.



Commerce 1000-Pound Delivery Wagon with the Special Body Designed for the Dog Catcher's Service of the Detroit, Mich., Police Department.



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Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

BOSTON'S SUCCESSFUL TRUCK SHOW.

The Boston motor truck show, the national exhibition for 1914, was in every way a success. The number of exhibitors was large and representative of the industry and practically every type of vehicle was displayed. The noticeable absence of freaks or untried constructions demonstrated that for service machines the designers have practically united upon designs that have been proven by continued practise and that they have found the public unwilling to invest in what is in any way regarded as uncertain.

The simplification of the machines was noteworthy and if changes had been made these were of what might be considered minor details, although necessarily important from the viewpoint of endurance. There is no question that the industry has reached a basis of commercialism, and that the purpose of builders will be to develop a single standard and continue this either as one or several types. Body development, however, has hardly been begun, and now that this is considered engineering work there is every reason to believe that material progress will be made.

SELLING TRUCKS ABROAD.

The manufacturers of motor wagons and trucks who are considering exploitation of foreign markets, if they desire to be successful and to retain business that can only be developed at such expense that its value is evident, must make provision for supplying parts and

giving practically the same attention as other concerns competing with them. One can parallel the condition to be met in the experience of those selling foreign vehicles in America, but in addition to this is the need of the owners for continuous service, and insurance against unnecessary delay is a decidedly important factor.

One of the best known American pleasure cars was exploited in an extremely promising foreign market by an unusually able representative, and because the company making it, which was one of the largest of the American industry, did not carry stocks of parts and have the same protection for those using its machines that it provided in its home market, the concern not only sacrificed a large amount of money, but caused its production to be seriously discredited. It is needless to state that this result was caused by management so poor that one will wonder why it was tolerated.

Companies desirous of foreign business had best concentrate on one or more markets and develop these with even greater care than is given to American customers, because reputation of both vehicle and manufacturer are dependent on the satisfaction of users.

SELECTING TRAFFIC ROUTES.

The majority of those in charge of highway transportation services are content to let the drivers choose the routes through which their vehicles shall be driven, and this means that the men in charge of the actual haulage believe that it is well to have the employees follow whatever highways they please without regard to traffic conditions, congestion or the state of the paving, when full knowledge of the probable cause for delay would dictate specifying the streets or roads. Unless there is some incentive the average driver is not specially anxious to do all he can in a day, and this fact, combined with retardations that cannot be avoided, means loss of time. Familiarity with locality maps and knowledge of construction and temporary obstructions would be extremely valuable information for the average head of a shipping department.

EXPANDING BUSINESS WITH TRUCKS.

The estimated cost of operating a vehicle is assumedly a fair basis on which to judge its economy, but there are other factors that must be considered in connection with its use. None is of greater importance than the possibilities for business expansion. If limited by the use of animals, there may be the best of reasons why development can follow the utilization of motor equipment, especially when the machines can be worked for a much longer period daily. Fixed charges do not increase, no matter whether operated six or 24 hours a day, and that there is no loss in efficiency from practically continuous use, two elements of vital potency.

ELECTRIC VEHICLE PRACTISE.

Influence of Temperature upon Electrolyte and the Variations of Densities Shown by Hydrometer Tests with a Given Acid Volume---Methods of Correcting Readings to Standards and Testing by Cadmium to Determine Capacity.

By William W. Scott.

THE critical point of lead-acid secondary cells in operation may be said to be 100 degrees Fahrenheit, and any temperature in excess of this is decidedly dangerous. That is, deterioration will probably result and a practical insurance is to operate the battery at such a maximum that the critical point will not be reached. The conditions that are recognized as engineering standards are eight hours' charge and discharge, with the temperature maintained at 70 degrees throughout the period. Authorities on storage battery construction maintain that the maximum temperature should not exceed 90 degrees, and strongly advise against operating at a temperature of 100.

When the temperatures are high the porosity of the plates is increased, the chemical activity is greater, and the tendency to sulphation is more pronounced. The pasted forms of plates are less susceptible to damage from heating than are those of the Plante type.

Manufacturers of secondary cells are practically agreed as to limitations of temperature, although there is some variance as to the maximum permissible. While no one type of cells has been considered, and statements can be applied generally, it is believed well to establish the specific directions of some of the best known makers with reference to cells that are recognized as standard and are in common use.

Exide and Exide-Hycap cells: "A direct indication of excessive overcharge is a very noticeable increase in the temperature of the cells. The temperature of a battery must not be allowed to exceed 110 degrees Fahrenheit, the cells in the middle of the battery being used as a guide. If the temperature is found to be running up toward the safe limit (110 degrees F.), the charging rate should be reduced or the charge stopped for a while".

Philadelphia cells: "The temperature must not exceed 100 degrees F. If the temperature nears this point, the charging current should be reduced, or the charge stopped until the temperature has fallen.

* * * Do not let the temperature of the battery rise above 100 degrees Fahrenheit at any time".

LBA cells: "The temperature of a battery must not be allowed to exceed 100 degrees Fahrenheit, the cells near the middle of the battery being used as a guide. If the temperature is found to be running up toward the safe limit (100 degrees Fahrenheit), the charge should be reduced or stopped for a while".

Gould cells: "The best results will be obtained at a temperature between 70 and 90 degrees Fahrenheit (21.1 to 32.2 Centigrade). A high temperature will tend to disintegrate the active material, attack the plate grid, char the wood separators and warp the rubber jars. As the temperature exceeds 90 degrees Fahrenheit, the more pronounced these actions will

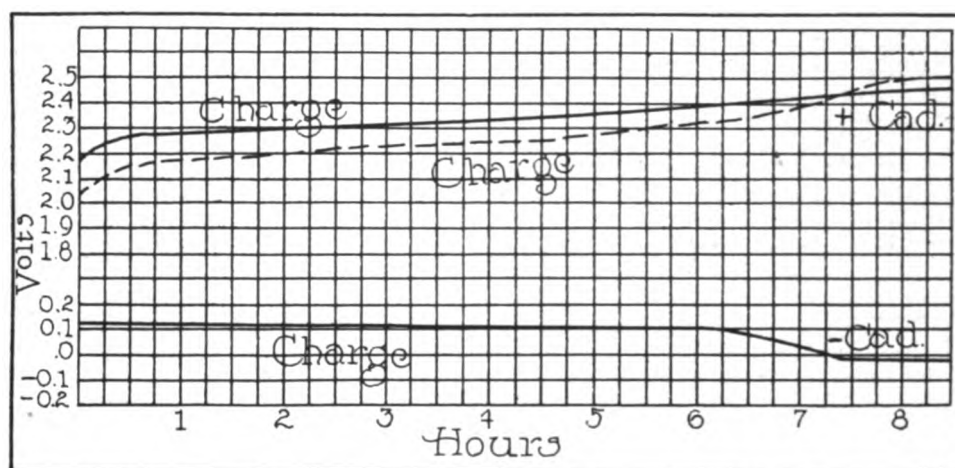


Fig. 1—Dotted Line Represents Cell Voltage, the Upper Curve the Cadmium Reading Against a Positive Plate and the Lower Curve the Cadmium Reading Against a Negative Plate.

become. The extreme temperature limit should not exceed 105 degrees Fahrenheit under any circumstances. The importance of interrupting a charge and allowing the battery to cool can be readily appreciated. The effect of a low temperature is to reduce the available capacity of the battery. This seeming lack of capacity is only temporary, as the capacity will be regained when the temperature is brought up. In keeping track of the temperature during charge, the inside cells instead of the outside cells should be read, as the former will be a few degrees higher than the latter".

US cells: "If, while charging, the battery commences to heat, which sometimes occurs if the temperature of the room is high, stop the charge and allow

the battery to stand until it cools. The temperature of the battery should never exceed 100 degrees Fahrenheit while the battery is charging".

One will note that these statements apply to charging temperatures, specifying the extremes that may be permitted. There is no good reason why these maximums should be reached, as nothing practical can be gained by allowing them, and there is probability of damage that can only be avoided by observing requirements of manufacturers for operating, as follows:

Exide and Exide-Hycap cells: "Experience has shown that the best results, both while charging and discharging, can be obtained when the battery temperature is between 70 degrees and 90 degrees Fahrenheit. A considerably lower temperature will materially reduce the available capacity; this reduction, however, should not give rise to the feeling that the battery is failing, as a return to normal temperature restores the capacity of the battery; on the contrary, however, if the temperature for any considerable time is above normal, the wear on the plates is excessive".

Philadelphia cells: "The battery should be kept

difference in these cells. This does not mean a wide difference in principle, but such variance that to obtain maximum results the instructions relative to each make of cell should be followed literally.

The variation is principally in the standards fixed for the electrolyte, and that these may be thoroughly understood the following are given for the makes of cells specified:

Exide and Hycap-Exide cells: "With the battery fully charged, the specific gravity of the electrolyte should be between 1.270 and 1.280, but due to sloppage and loss by spraying, however, there is a gradual lowering of the gravity, so for this reason it may be allowed to fall to 1.250 when fully charged; then gradually restore to normal by the addition of 1.275 specific gravity electrolyte when replacing evaporation".

Philadelphia cells: "The electrolyte of a fully charged Philadelphia battery should be 1.300 specific gravity at 70 degrees Fahrenheit".

LBA cells: "With the battery fully charged, the specific gravity of the electrolyte should be between 1.275 and 1.300".

Gould cells: "It is therefore advisable to keep the density fairly close to 1.275 specific gravity when the battery is fully charged. * * * The specific gravity of 1.275 herein given is figured at 80 degrees temperature".

US cells: "This must be a chemically pure, dilute sulphuric acid of 1.285 degrees specific gravity, or 32 degrees Baume, or a mixture of approximately one part pure acid to 2.75 parts distilled water by bulk or volume. * * * At the end of the charge the gravity should read 1.280 degrees".

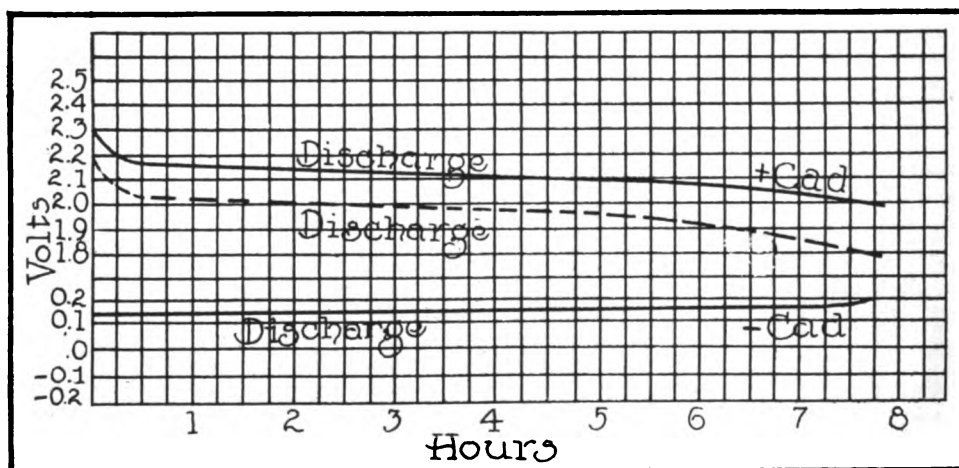


Fig. 2—Dotted Line Represents Cell Voltage, the Upper Curve the Cadmium Reading Against a Positive Plate and the Lower Curve the Cadmium Reading Against a Negative Plate, the Cadmium Being Negative to Both Plates.

and charged in a moderately warm place during the winter. If it becomes thoroughly chilled, it will require a higher voltage to charge, and the mileage will be somewhat reduced".

LBA cells: "Experience has shown that the best results, both while charging and discharging, can be obtained when the battery temperature is between 70 degrees and 90 degrees Fahrenheit. A considerably lower temperature will materially reduce the available capacity; this reduction, however, should not give rise to the feeling that the battery is failing, as a return to normal temperature restores the capacity of the battery. On the contrary, however, if the temperature for any considerable time is above normal, the wear on the plates is excessive".

Gould cells: This was dealt with in the first statement.

The efficiency of every cell depends upon the electrolyte, and comparison of the practise specified by each maker will demonstrate that there is a material

From the foregoing one will understand there is sufficient variance with reference to temperature and density to justify the statement that each make of cell must have specific treatment. No purpose will be served by varying from the instructions specified by the manufacturers, for these have been established by careful experiment and experience, and were determined with accurate knowledge of possibilities. Based on practical results, nothing is lost by observing them.

The acid used in mixing electrolyte is assumed to be commercially pure, which is rated at 1.835 specific gravity. Taking this as a basis it is found that at 60 degrees an electrolyte having a density of 1.250 specific gravity will contain 35.50 per cent. of sulphuric acid, and that at 70 degrees it will show 1.247 specific gravity, at 80 degrees 1.244 specific gravity, at 90 degrees 1.241 specific gravity, and at 100 1.238 specific gravity.

Taking the Exide or the Exide-Hycap cell as an example, the maker specifies that the best operating

result is obtained at temperatures between 70 and 90 degrees, and assuming the average of the two, or 80, as that which will be satisfactory, and desiring an electrolyte of 1.275 specific gravity, it is found that this will contain approximately 39.75 per cent. acid. The exact specific gravity of a 39.75 per cent. acid solution is 1.277, which at 90 degrees would drop to 1.274, and at 100 degrees to 1.271. A solution that would have a specific gravity of 1.250 at 80 degrees would contain approximately 36.25 per cent. of acid, which shows that there is permissible a variation of 3.50 per cent. of acid before the cell will be so much reduced that restoration of acid is imperative. That is, when in a condition to do its maximum work a cell may range from 1.271 to 1.292 in specific gravity, according to variation of temperature without change of electrolyte density, and as the acid is gradually lost the density may lessen to a range of from 1.244 to 1.265, these limits representing the differences between 100 and 30 degrees.

One will observe that there is a difference of 21 degrees approximately in the reading of the specific gravity of an electrolyte containing a given volume of sulphuric acid because of temperature alone, between 30 and 100 degrees Fahrenheit, the density increasing as the temperature decreases, and this law or rule can be absolutely depended on. With this as a basis, and taking the range of specific gravities between 1.151, which represents the minimum density that will probably be reached in practise, and 1.306, which can be regarded as the maximum, there is a total of 155 degrees of the hydrometer scale. There is no reason why this variation of temperature and density should be worked out to degrees, for battery practise does not require this exactness, but it is entirely practical to tabulate this to a point where it will serve as a reference and be sufficiently close so that conditions can be determined very accurately.

The following tabulation has been prepared with an electrolyte composed of 1.835 acid as a basis, and a series of 16 different densities, from 22 to 42.62 acid has been stated. From each of these readings the densities with variations of 10 degrees of temperature, from 30 to 110 have been approximated, so that corrections can be quickly and readily made. Thus, if one desires to determine the condition of an electrolyte with reference to acid volume, this can be ascertained by taking the temperature and hydrometer readings, and comparing these with the tabulation. It will be seen that each per cent. of acid volume represents about nine points decrease or increase of the hydrometer reading, and that approximately each degree of temperature represents about .3 degree variation of the hydrometer reading. It will be noted by referring to the tabulation that a drop of 40 degrees in temperature is approximately equal to an increase of 1.38 per cent. (actual) acid. That is, a hydrometer reading of 1.277 at 80 degrees temperature will show an acid density of 39.75, and at 40 degrees will show an acid density of 38.37 variable with temperature.

The tabulation of acid volume and specific gravities and temperatures is as follows:

Per Cent. of 1.835	Degrees of Temperature, Fahrenheit									
	30	40	50	60	70	80	90	100	110	
42.62	1.315	1.312	1.309	1.306	1.303	1.300	1.297	1.294	1.291	
41.25	1.304	1.301	1.298	1.295	1.292	1.289	1.286	1.283	1.280	
39.75	1.292	1.289	1.286	1.283	1.280	1.277	1.274	1.271	1.268	
38.37	1.281	1.277	1.275	1.272	1.269	1.266	1.263	1.260	1.257	
37.00	1.270	1.267	1.264	1.261	1.258	1.255	1.252	1.249	1.246	
35.50	1.259	1.256	1.253	1.250	1.247	1.244	1.241	1.238	1.235	
34.00	1.248	1.245	1.242	1.239	1.236	1.233	1.230	1.227	1.224	
32.75	1.238	1.235	1.232	1.229	1.226	1.223	1.220	1.217	1.214	
31.25	1.227	1.224	1.221	1.218	1.215	1.212	1.209	1.206	1.203	
30.00	1.217	1.214	1.211	1.208	1.205	1.202	1.199	1.196	1.193	
28.50	1.207	1.204	1.201	1.198	1.195	1.192	1.189	1.186	1.183	
27.25	1.197	1.194	1.191	1.188	1.185	1.182	1.179	1.176	1.173	
26.00	1.188	1.185	1.182	1.179	1.176	1.173	1.170	1.167	1.164	
24.50	1.178	1.175	1.172	1.169	1.166	1.163	1.160	1.157	1.154	
23.25	1.169	1.166	1.163	1.160	1.157	1.154	1.151	1.148	1.145	
22.00	1.160	1.157	1.154	1.151	1.148	1.145	1.142	1.139	1.136	

The density of a secondary cell should never be permitted to fall below 1.150 specific gravity, and generally the minimum is 1.160 to 1.180, these two figures corresponding to 1.7 volts and 1.8 volts, so that when 1.7 volts is indicated at 80 degrees, for instance, the density of the electrolyte is about 24 per cent.

In charging, the voltage of a cell rises comparatively slowly for a period, then remains comparatively constant until considerable gas is liberated, and then rises until it again remains constant, at which time the maximum voltage may be regarded as having been reached. The voltage rise of a cell is best expressed by a curve, but it may be followed very logically by readings covering stated periods of the charging. As has been stated, the slow rise of the voltage at the beginning of the charge is due to the slower diffusion, and at the latter part of the charge the increased resistance, during which time the amperage is decreased, is an important factor. One can accept with certainty the fact that there is a uniform increase of voltage variation between pure sponge lead and lead peroxide electrodes between specific gravities of 1.050 and 1.300, and for this reason the density of the electrolyte and the condition as to gassing will give a positive and definite knowledge of the condition with relation to the charge.

A characteristic of every lead-acid cell is that it will, following either charge or discharge to what may be considered the highest or lowest voltage value, regain its normal voltage within a comparatively short time, and after the charging one may note the liberation of hydrogen gas from the negative plates. When this omission of gas, which is a loss of energy and will continue a short time, has ceased, the voltage of the cell will be found to be approximately its full open circuit value.

But the fullest efficiency cannot be realized from a cell unless action of the current and the electrolyte upon the plates is such as will establish full capacity. By this is meant that if one series of plates of the element is not fully charged the work that can be obtained will be represented by the difference between

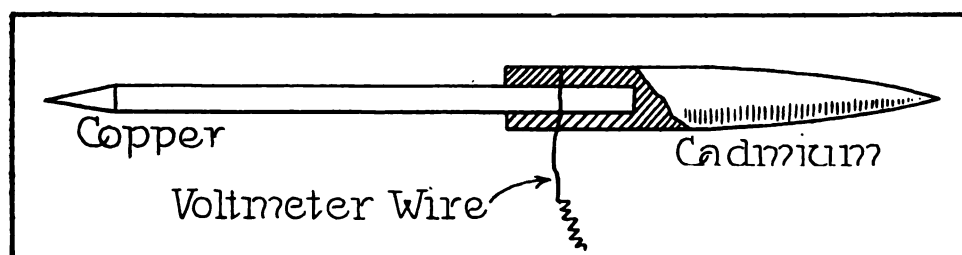
the plate or plates least charged and those completely charged. This explains why a cell may be affected by a condition that may only be found with a single plate, and why such a cell will materially influence an entire battery of cells. For this reason the condition of each cell and each set of plates is important. Charging with the voltage and amperage indicated by instruments will develop need of investigation when the batteryman is experienced, but test only can determine the exact cause, and for this reason the gravity reading of the cells is regarded as being the more certain.

It is, however, practical to test the plates, and this is usually done with a cadmium tester, which can only be used with a voltmeter having a high resistance, for a considerable current flow will be developed and polarization will obtain. The best form of cadmium tester can be made by procuring two pieces of cadmium rod 2.5 inches length and .28125 inch diameter, and two pieces of hardened copper rod or wire 3.25 inches length and .15625 inch diameter. Holes should be drilled into one end of the cadmium rods a depth of .75 inch and tapped, and one end of the copper rods threaded and screwed into the cadmium, making solid contact. The ends of the copper and cadmium rods

sary, with certainty. If but one combination rod is used the voltmeter connection will need to be reversed to make the negative plate readings when the cell is being charged.

The voltage "across" a cell is obtained by contacting the positive and negative leads from a voltmeter firmly with the positive and negative terminals. With the form of copper-cadmium tester described, with the centres of the combination rods insulated with tape, the readings can be made by contacting the copper points with the terminals for the "across" readings, the sharpened points insuring good contact. When the cadmium readings are to be made the cadmium points should be kept wet with electrolyte or dilute sulphuric acid of approximately the same density, and can be moved from cell to cell in a glass or china cup.

Assuming that a cell has been discharged: With the voltage reading 1.8, which is a reasonable minimum, the cadmium test can be made. With the cadmium covered with perforated rubber tube the end may be placed in the electrolyte without fear of it contacting with any of the plates. With the cell voltage stated the cadmium will be negative to both the positive and the negative plates, but the readings will show a voltage of approximately 2.05 volts between the cadmium and the positive plates, and between the cadmium and the negative plates .25 volt. The test should be made when the cell is discharging at normal rate, and the indication is obtained by subtracting cadmium-negative reading from the cadmium-



A Composite Tester of Copper and Cadmium Rod, Two of These Being Connected with a Voltmeter and Used to Test Cells for Low Capacity.

should be ground or filed to points, tapering for perhaps 1.5 inches from either end. The tester rods will, when finished, be five inches length. Through the centre of the end of the cadmium rods into which the copper rods are screwed, holes should be drilled of sufficient diameter to admit the end of wires extending to the voltmeter. These wires can be fixed permanently by soldering if desired, and the wire leads covered with a rubber tube. The cadmium ends of the tester should be covered with pieces of thin rubber tube perforated with small holes, after taping the centre for about two inches, at either side of the wires. Care should be taken to insure the cadmium being pure, otherwise it will contaminate the cell. After the tester has been made the cadmium portions should be placed in a small quantity of electrolyte for a short time, when they will become coated with cadmium sulphate, which should not be removed. The cadmium test is not usually needed unless in the case of cells that have been in use a considerable time and the elements somewhat deteriorated, or for the testing of low capacity cells. With the form of tester that has been described the voltmeter can be used for all purposes and the cadmium test can be made, whenever neces-

sary, with certainty. If but one combination rod is used the voltmeter connection will need to be reversed to make the negative plate readings when the cell is being charged.

When the charging has been begun the cadmium is negative to the negative or sponge lead plates, but as the charging advances the difference between the two lessens and eventually the cadmium becomes positive to the negative plates and negative to the positive plates, due to the reduction of the sulphation and the transformation of the lead sulphate to lead peroxide. When the charging is complete the reading between the cadmium and the positive plates will show about 2.30 volts, and between the cadmium and the negative plates .20 volt, but as the reading is in opposite directions the voltages are added, this giving a total of 2.50 volts. The illustrations are for the purpose of familiarizing the reader with the manner of reading the indications of the cadmium tests.

In some instances the reduction of the lead sulphate on the plates is not equal in charging, and until this reduction is accomplished the test will show the negative plates are positive to the cadmium. Instances have been observed where the negative plates re-

mained positive to the cadmium up to as high as 2.50 volts, the positive plates being completely charged. Such cells always show low capacity, but when the sulphation is removed by continuation of the charging, which will be evidenced by the cadmium tests, efficiency is restored. One can safely regard a cell as charged when the negative plate will show a reading of from .05 to .10 volt against a cadmium tester, the cadmium being positive, and when a negative plate shows a reading of .25 volt against a cadmium tester, the cadmium being negative and the plate positive, the cell may be regarded as discharged.

The following may be regarded as a summary of the cadmium tests for both charging and discharging:

Charging.	Discharging.
Beginning, Cell Voltage...1.80	Beginning, Cell Voltage...2.50
Cadmium is	Cadmium is
Negative to Negative Plate .25	Positive to Negative Plate .10
Negative to Positive Plate 2.05	Negative to Positive Plate 2.40
Voltage is difference in readings.	Voltage is sum of both readings.
Readings in one direction.	Readings in both directions.
Ending, Cell Voltage.....2.50	Ending, Cell Voltage.....1.80
Cadmium is	Cadmium is
Negative to Positive Plate 2.40	Negative to Positive Plate 2.05
Positive to Negative Plate .10	Negative to Negative Plate .25
Voltage is sum of both readings.	Voltage is difference in readings.
Readings in both directions.	Readings in one direction.

The charging and discharging readings should be made with the current flowing, at the beginning and end of the charging, start and finish of discharging, and during the charging and discharging at different intervals, care being taken that the cadmium does not contact with the electrodes, the points of the testers being firmly pressed against the terminals. It is not improbable that there will be a slight difference between the observed voltage of the cell and the voltage as determined by the cadmium tests, but this will be due to deflection between the cadmium and the negative plates.

In the use of the cadmium tester when the cell is charging the reading to positive is made by placing one copper point on the positive terminal and placing the cadmium point of the other terminal of the voltmeter in the electrolyte. When the cell is discharging, for testing, to illustrate, the negative reading to cadmium can be made by placing one cadmium point in the electrolyte and moving the copper point of the other terminal on the negative terminal. When the charge has been concluded the cadmium must be removed from the solution and contacted with the negative terminal, and the copper point removed from the positive terminal and the cadmium point placed in the electrolyte.

In the event of the charging voltage reaching 2.5 and the voltage not indicating between the negative plates and the cadmium, the cell is not fully charged, and the current should be continued to bring it to its actual capacity. Where the grids of the positive plates are a lead-antimony alloy the difference in the potential between the negative plates and the cadmium will probably be about .05 volt, at the conclu-

sion of the charge, but should the plates be of pure lead, with the cadmium positive to the negative plates the voltage may reach .12 or even .15 volt.

It is practical to make the cadmium tester with but one of the combination contacts, this being connected with the negative pole of the voltmeter, but the voltmeter connections will have to be reversed to take the negative plate readings when the cells are charging. It is understood that the cadmium tests are necessary only when cells are low in capacity and data are to be used for the purpose of restoring them.

At Fig. 1 are shown curves in which the dotted line represents the cell voltage during charging. The curve designated as + cad. indicates the potential of the positive plate against a cadmium tester during the charge, and the curve marked — cad. indicates the potential of the negative plate against a cadmium tester. At Fig. 2 are shown curves in which the dotted line represents the cell voltage during discharge. The curve designated as + cad. indicates the potential of the positive plate against the cadmium tester, and that designed as — cad. indicates the potential of the negative plate against the cadmium tester, in both tests the cadmium being negative to both the positive and negative plates.

By comparing the curves of Figs. 1 and 2 one will note that when the charge has progressed for about six hours the potential of the negative plate falls and when it has reached zero it becomes negative to the cadmium, a condition that is continued until the end of the charging. These curves were made with an average charging current of 37.5 and a discharge of 35.

(To Be Continued.)

WILL VOTE ON BOND ISSUE.

A proposition to authorize an issue of first mortgage bonds, to the value of \$1,500,000, payable in 15 years, has been made the stockholders of the United States Light & Heating Company, and the proposal will be acted upon at a meeting at Portland, Me., April 9. If the issue is authorized, the proceeds of the sale of the bonds will be available as working capital.

The plans of the company for expansion have been practically determined, and these comprehend increased production of storage batteries and engine starting and lighting equipment for gasoline motor vehicles. After May 1 the general offices of the company will be located at the factory at Niagara Falls, the purpose being to remove them from New York, leaving a sales and service station in that city.

The charter of the Keller Cyclecar Corporation, which was recently incorporated at Wilmington, Del., under the law of the state, authorizes capital of \$250,000 and the manufacture of motor trucks in addition to the production of highway vehicles and aircraft generally. The incorporators are H. E. Latter, W. J. Maloney and O. J. Reichard, all of Wilmington.

ELECTRICS FOR MAIL HAULAGE.

Postal Transfer Service Buys 20 G. V. Two-Ton Wagons for New York.

The Postal Transfer Service, Inc., a company that has contract for haulage of some of the mail on Manhattan Island, New York City, has purchased 20 two-ton General Vehicle wagons, which will be utilized in the general work of the concern. The contract has been made and the machines will be delivered as rapidly as they can be completed. This company succeeded to the business of the New York Mail Company, which had contract for the work for a considerable period, and the demands have been very much increased by the inauguration of the parcel post division of the postal service. The company was organized in the spring of last year and the bid made for what is officially known as route 407.012, was accepted in September.

The company has contract to haul all the mail between the general postoffice and the branches and the railroad terminals south of 42nd street, it being divided into three classifications. The "mail-messenger" class entails the haulage of the incoming European mail between the receiving pier and the general postoffice and the receiving pier and the outgoing railroad terminals, handling all of the mail brought into the city of this class; the "transfer" class is the haulage between the railroad terminals, this requiring trips to Jersey City, and the "station" class is the haulage between the general postoffice and the branch stations. This does not include the collection of mail at the substations or at the plants of individual concerns.

The firm began business with 80 two-ton and 20 one-ton gasoline machines, this including some of the equipment of the company that it succeeded, and the 20 wagons just bought will replace a similar number that has been in service until no longer dependable. The company expects that it will be necessary to increase its equipment to 1250 vehicles to take care of the business. The electric vehicles were purchased after inquiry into the service of the Motor Delivery Company, which has the contract for haulage of the mail north of 42nd street on Manhattan, to 180th street on the west side and to Fordham on the east side of the city, and since 1909 has used from 22 to 28. In 1913 the company's machines were driven a total of 336,000 miles in 304 days. The haulage is to and from branch postoffices and the 42nd street terminal. The company originally took over a horse vehicle contract and utilized electric machines, and has continued its service with them, using no less than 14 of these for parcel post work.

The Postal Transfer Service has established a garage at First avenue and 42nd street, where the electrics will be stored when not in use. The president of the company is H. Rowley and J. J. Cassidy is the vice president and in charge of the operating.

PRACTICAL OPERATING HINTS.

The automobile bureau of the New York Edison Company, New York City, has distributed to users of electric vehicles in the Metropolis and vicinity a card that is intended for the use of the drivers, this having on one side some very practical "Dont's for Winter", and on the reverse a list of the 24 emergency charging stations of the company, the addresses and the capacity in amperes for charging. These stations are generally in Manhattan, but five of them are in the Bronx. The capacities are 60, 100 and 200 amperes. The card is a convenient reference for the drivers in the event of emergency, and a copy can always be carried in a machine.

The tentative plans for the second European visitation of the Society of Automobile Engineers are for the party to leave New York City, Oct. 10, with the purpose of seeing the Paris Salon and the Olympia show in London, going first to Paris, thence to Turin and Milan in Italy, then to Lucerne in Switzerland, Stuttgart, Cologne and Essen in Germany, Brussels and Antwerp in Belgium, then to London. The itinerary is made up for 39 days' absence.

The Buchanan Electric Steel Company, Buchanan, Mich., has begun the production of cast steel wheels for service wagons and trucks which are of the disc type and built with hollow rim and cored hubs to insure lightness. The metal used is an alloy steel, heat treated to insure strength. Brake drums are cast integral with the wheels when desired. The wheels are built to conform to the S. A. E. requirements.

The Goodyear Tire & Rubber Company of Canada, Ltd., has elected these officers for the following year: President, F. A. Sieberling; vice president and sales manager, R. P. D. Graham; treasurer and general manager, C. H. Carlisle; secretary and assistant treasurer, C. J. Oille; superintendent, E. H. Koken.

The New England branch of the Vulcan-Bessemer Company, Boston, Mass., is now in charge of Charles E. Collard, who was recently manager of the truck tire department of the New York branch of the Goodyear Tire & Rubber Company, and who is well known in the industry and trade.

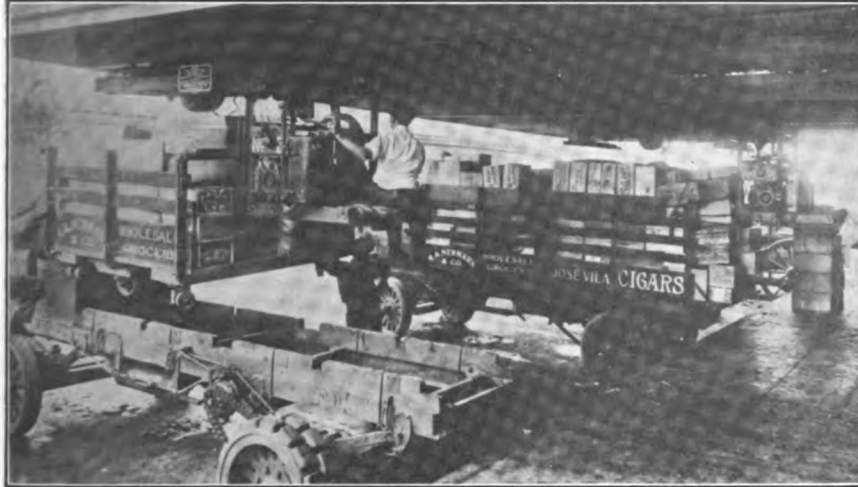
The Chicago branch of the Universal Motor Truck Company, Detroit, Mich., has been purchased by William A. Schaefer and F. H. Luther, who are continuing the business as the Chicago Universal Motor Truck Company.

The Pacific Tire & Supply Company has been incorporated at Seattle, Wash., with capital of \$700,000 by B. L. Gates, Austin E. Griffiths and A. K. Allen, to manufacture automobile tires and rubber specialties.

LOADING BY OVERHEAD CONVEYOR SYSTEM.

ECONOMY is a relative term. Business men who have given careful consideration to the subject of motor transportation are readily convinced that

still further reduced, requiring the services of a lesser number of men for a given amount of work, and eliminating the danger of making mistakes, since it is possible to make up orders and check them ahead of time without confusion and hurry at the last moment.



Telpher Loading Hand Trucks on Specially Designed Commercial Car Chassis in Service of M. A. Newmark & Co., Los Angeles, Cal.

economy and efficiency are very closely related. In other words, there are certain lines, at least, in which it is possible to effect a saving over horse drawn equipment only when the motor truck can be utilized to its fullest capacity, particularly with reference to time. This applies to practically all lines, when it becomes a matter of the greatest economy.

Within the past few years wholesale grocers have given unusual attention to the question of highway haulage. In many instances their travelling salesmen have been supplied with automobiles, the better to cover their territory and reach customers without depending upon railroad schedules. Possibly it was the success which attended this innovation which caused the heads of such firms to investigate the possibilities of motor trucks.

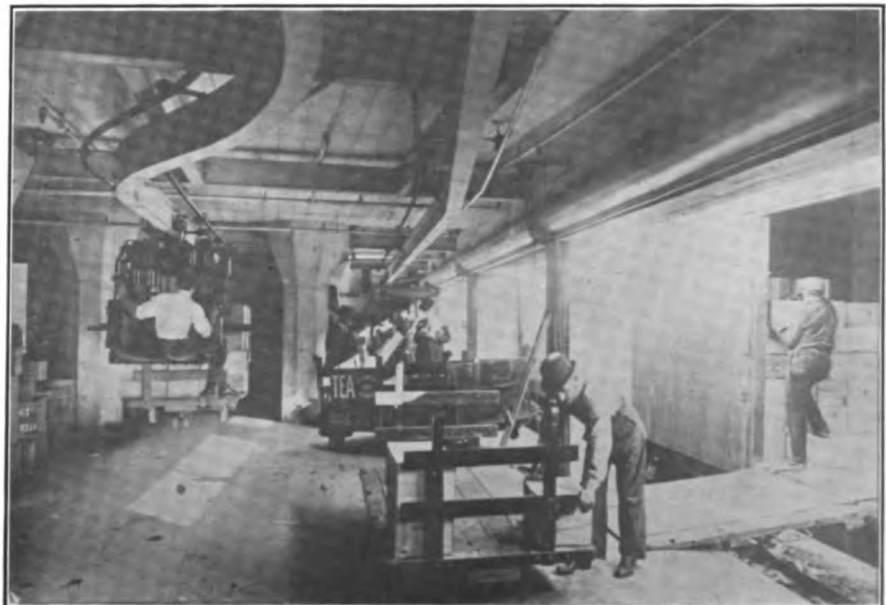
The advantages of motor equipment in this field are many, including the ability to make quick deliveries at the door of the customer, and the elimination of freight charges and the necessary additional handling of the packages. However, it is extremely essential that the truck shall be kept busy, and to this end many interesting plans have been devised. One of these is indicated by the accompanying illustrations.

The system is that employed by M. A. Newmark & Co., Los Angeles, Cal., and by its use it is stated that the company saves at least 45 minutes in loading each vehicle. In addition, the handling of packages is

position wherever wanted.

In practise the small trucks are loaded while the motor trucks are on a delivery trip, and as fast as the orders are received, by mail or over wire. When the motor trucks return the telpher picks up the empties and replaces them with filled receptacles in waiting, and there is almost no delay.

As will be noted by the accompanying illustrations, the telpher equipment includes an electric motor, with provision at the rear for the operator, who occupies a convenient seat and directs the placing of the hand trucks. Suitable belts, running over pulleys, are arranged to pick up the trucks and hold them suspended while the electric motor conveys them about the ware-



Indicating the Overhead System Employed to Place Hand Trucks in Various Parts of Newmark Wholesale House.

house. Several of these telphers are employed to accommodate the needs of the company.

The Newmark house is not only one of the first concerns on the Pacific Coast to use motor trucks in its business, but it is one of the largest users of such vehicles in Los Angeles. As soon as it had been demonstrated to the satisfaction of its officials that mechanical transports offered a means for increasing the range of action, practically all of its horse drawn wagons were replaced by automobile equipment.

For more than a year now it has been operating a fleet of 11 GMC trucks of 3.5 and five tons capacity. The overhead conveyor system described above was installed soon after the decision to utilize such vehicles was made, and this plan has played a very important part in the success of the enterprise. According to the officials of the company it has increased the efficiency of the trucks at least 30 per cent.

GROW SELLS REPUBLIC TRUCKS.

The George Grow Automobile Company, 321-3 Columbus avenue, Boston, has been made the New England agent for the distribution of Republic one-ton wagons, made by the Alma Motor Truck Company, Alma, Mich., which were exhibited at the Boston motor truck show. This company is the largest firm of the kind in New England and is widely known.

The Republic machines are assembled from components made by some of the leading manufacturers in the industry, who specialize production and standardize after exhaustive tests to determine engineering and quality of material used. The chassis include Continental motors, Eisemann magnetos, Hartford cone clutches, Covert transmission gearsets, Russell jackshafts, Lewis springs, La Vigne steering gears and other equally well known materials in frames, bearings, etc., and they are built with left side drive and centre control levers.

The announcement is made that agencies will be established in different parts of New England and that those who desire can purchase these machines on time payments.

C. W. Richards, for several years factory manager for the Stevens-Duryea Company, Chicopee Falls, Mass., has been engaged as superintendent of production by the Driggs-Seabury Ordnance Corporation, Sharon, Penn., which is systematically strengthening its organization to insure the increased volume and perfected product necessary through several large contracts which were entered into at the opening of the year.

John E. Dray, formerly connected with the Interstate Sales Company, San Francisco, Cal., has become associated with the Galveston, Tex., Motor Car Company, and will specialize his endeavors in the sale of GMC trucks in the different towns and cities along the Texas coast.

BREWERY FULLY MOTORIZED.

The Los Angeles Brewing Company, Los Angeles, Cal., on Jan. 31 by auction sale disposed of all its horse equipment, removing from service 52 animals, 12 wagons and three buggies, and 13 sets of harness. The company announced this disposal to the highest bidders, because of it having purchased White motor wagons and trucks for the use of its shipping and distributing departments.

The company acquired its first motor truck three years ago and worked it in all kinds of service with such success that others were bought. The efficiency of the machines was so satisfactorily proven in comparative work with horses that nine vehicles, ranging from 3000-pound wagons to five-ton trucks, were ordered. When these were delivered the company advertised its horse equipment for sale, it having then motors for all purposes. The small machines are used for house-to-house deliveries, and the trucks are utilized for keg and barrel haulage.

WHITE TAXICAB SERVICE.

The Taxicab Association, Ltd., has inaugurated business in New York City with an equipment of 26 White cabs, this being one of the largest concerns to engage in public service in New York since the abolition of the exclusive privileges controlled by leading hotels, and the regulation of the cab stands by the police department. The president and general manager of the company is M. Bundy Cole, who was manager of the National Bank of Nicaragua for a number of years, and who was responsible for the change of the monetary system of Nicaragua from paper to gold. C. A. Jones, president of the Nicaragua Railway Company, is vice president. The statement is made that other companies are now organizing, and that one will engage in business as soon as the equipment and headquarters can be obtained, on a considerably larger scale.

BROWN COMPANY NOT INSOLVENT.

The Brown Commercial Car Company, Peru, Ind., which was petitioned into insolvency recently, has filed a plea that it is not insolvent and that the facts in the petition are not a true representation of conditions. The plea has been referred to a referee and upon this decision will be based further proceedings.

The Motor & Accessory Manufacturers will move to new headquarters in the Aeolian building, 29 West 42nd street, New York City, about April 1, from No. 17 in the same thoroughfare.

The International Motor Company has established its executive offices at its service station at West 64th street and West End avenue, New York City, removing them from Broadway and 57th street.

HIGH CLASS SCHOOLS WITH MOTOR 'BUSES.

THE necessity of good education is unquestioned by all, and one of the most cogent arguments made by those who advocate city life is the greater opportunities educationally than are practical, or even possible, in the country. The rural community can afford elementary schools, but the limited number of scholars and the necessarily larger expense of more advanced education, as well as the distances that are almost if not quite prohibitive for boys and girls to travel without conveyances, are conditions that are generally met with by those who are desirous of promoting as liberal education as is possible in country life.

The condition stated has frequently been met to a certain extent by several towns or districts uniting to secure better supervision of schools, this insuring the service of well qualified superintendents, but distance has been the condition that has always limited possibilities, because of the lack of transportation. Where street or steam railroads are available the solution is simple, but obviously these serve but a small part of the population. There is another aspect—the cost of transportation—for where this must be met by the parents in addition to the expense of supporting the children any material item may be a burden, if not a prohibition.

The more recently settled sections of the country must meet these educational problems more generally than those portions more thickly populated, but examples of the possibilities for promoting education through the use of motor omnibuses may be taken from California, these being the unity of several towns for establishment and maintenance of high schools, and providing transportation for the pupils.

From a practical point of view one large school with efficient teachers and comprehensive courses is far superior to several schools and inferior organizations that might be possible within walking distance, and there is also a decided benefit in consolidation where the matter of transportation can be satisfactorily dealt with.

At distances varying from nine to 15 miles apart, in the vicinity of Fullerton, a prosperous town in Orange county, California, lie five school districts—Olinda, Placentia, La Habra, Randolph and Orange-thorpe. Each of these districts has supported grammar schools for many years, but the problem of giving their graduates the benefit of a high school education was a very serious one. The motor truck has solved this difficulty.

About two years ago the five outlying districts combined with Fullerton in the formation of a union high school district, and three 1.5-ton trucks, with passenger bodies, were purchased in order to transport the pupils thereto. The system worked out so satisfactorily that the high school recently added two fine new 'buses to the passenger service. More than 100 pupils, or approximately half of the enrollment, are now being conveyed between their homes and the school in these vehicles.

The motor 'bus equipment represents a total investment of \$13,700. The chauffeurs are high school boys, who take turns at the wheel, and receive 50 cents a day for their services. There is a large garage on the school grounds, and a mechanic is employed constantly to care for the trucks and keep them in good condition. Special care has been taken to provide for the comfort of the scholars, some of whom travel no less than 26 miles a day in the 'buses.

As a result of the concentration noted, the Fullerton union high school district has been able to erect a magnificent group of buildings. The added attendance made possible by use of the trucks has provided the school with means to engage excellent instructors and to include new courses, which are a decided advantage to the pupils.

It may be added that the operating expense of the five vehicles is borne entirely by the union school district and not by the individual students. The five motor 'buses have been in constant service, making regular trips over the several routes each school day. Such work as has been necessary, apart from the daily inspection and adjustment in the school garage during the school hours, has been done on Saturdays.

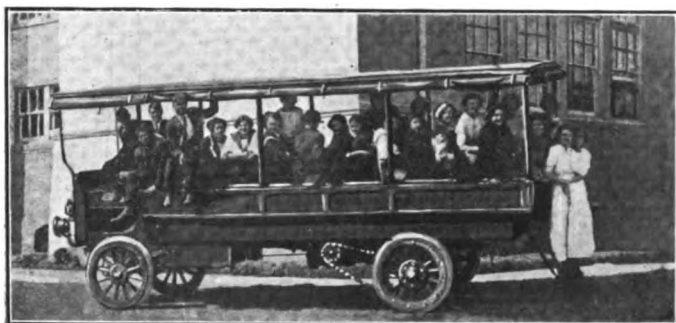
At Corvina and Huntington Beach, in the same state, the towns have united the school districts for high school education and have purchased motor truck chassis equipped with omnibuses bodies, which are



The Latest Motor Omnibus Designed for Carrying the Scholars of the Fullerton, Cal., Union High School to and from Their Homes—The District Owns and Uses Five of These Machines.

used during the days the schools are in session. Here the 'buses are also driven by school pupils, who cover specified routes daily, taking the pupils from their homes to the schools and from the schools to their homes, making the trips on schedule and insuring attendance. The omnibus that is illustrated is in use at Corvina, where the machine makes a circuit of 12 miles four times each day, taking the scholars from their homes in the morning to the school, to their homes for lunch, and repeating this in the afternoon. The trucks are available for taking the scholars to different school functions, and at other periods of the day are used by the school boards for other work that may be necessary.

The work on the machines is largely done by the school boys, and the cost of operation is much less than were they driven by regularly employed drivers. One school principal believes that the machines are as essential to the success of the schools as are the libraries, and maintains that without them the attendance would be such that the schools could not be maintained as they are now. The machine shown in the illustration is a Moore chassis, made by the Pacific Metal Products Company at Torrence, Cal., fitted with



The Type of Moore Chassis and Omnibus Body Used by the Corvina and Huntington Beach, Cal., Union High School Districts for Transporting Pupils.

a body that may be enclosed with curtains in the event of storm. A similar machine is used at Huntington Beach.

The Globe Iron Works at Sacramento, Cal., has been purchased by the Lincoln Motor Truck Company, which will, when the equipment has been installed, begin the production of 1000 and 1500-pound delivery wagons. The general offices and the sales department will be located at San Francisco.

B. M. Beedon, who was associated with the Firestone Tire & Rubber Company and the American Voiturette Company, has been appointed a travelling representative for the Standard Motor Truck Company, Detroit, Mich.

The Lincoln Motor Truck Company of Los Angeles, Cal., is making overtures to business men of Sacramento, that state, for the location of its plant in that city. The company as yet is being promoted.

NEW ORLEANS ELECTRIC "BOOSTERS".

The Electric Vehicle Association of New Orleans, La., was organized at a recent meeting of men interested in the promotion of the use of electric vehicles in that city, which will be devoted to generally interesting the people in the value of these machines for all practical purposes, without reference to any particular make of equipment. The proposition was made to those in any way connected with electric vehicle or equipment selling and at a gathering at the De Soto Hotel, attended by 28 persons, the association was formed with T. C. Rhodes as president and W. E. Clement secretary. The president was authorized to appoint an executive committee of seven that will pass upon all matters.

The organization of the association primarily resulted from the endeavors of the representatives of electric vehicle and electric equipment manufacturers who are located in or visit New Orleans frequently, who are interested in the education of the people in electrical transportation, and believe that united endeavor in this work is essential to material progress, being willing to establish business competition on the sane basis of quality and merit, represented without criticism of other products. In other words, they are united for constructive development and condemn destructive selling methods.

Among those who spoke at the meeting for organization were: C. W. Bell of the Electric Storage Battery Company, A. D. Stevenson of the Edison Storage Battery Company, and H. J. Myers, Jr., of the Baker Motor Vehicle Company. Mr. Bell described the activities of the Philadelphia section of the Electric Vehicle Association of America as an example of possibilities of united activities, and he proposed that an educational advertising campaign be inaugurated and continued systematically.

ALL VEHICLES LIGHTED IN NEW YORK.

An amendment to the highway law of New York State provides that all horse drawn vehicles in use on the highways, unless loaded with hay, shall carry lights at night, provided that they are in use outside of large cities where the street lights are not more than 500 feet apart. This provision, however, is expected to insure that practically all vehicles on the roads at night shall carry lights, and is regarded as a distinct advance toward making traffic safer in the country sections.

J. S. Dowling has taken charge of the plant of the Brantford Motor Truck Company, Ltd., Brantford, Ont., which has been declared bankrupt, and his purpose is to manufacture the material in stock and to continue the company as a going concern. The liabilities of the company are \$67,941.93, and the assets are \$57,236.32.

CONTROL REAR AXLE PATENTS.

The Kardo Company has been organized at Cleveland, O., with capital of \$1,500,000, with Alvan Macaulay, vice president and general manager of the Packard Motor Car Company, as president; T. W. Frech of the Peerless Motor Car Company as vice president, F. C. Dorn of the American Ball Bearing Company as secretary and treasurer, and with Milton Tibbetts, F. S. Perry and Walter C. Baker, representing the Packard, Peerless and American Ball Bearing companies respectively, as directors. The company controls a series of patents issued to W. C. Baker, Hopewell, Charles T. C. Sangster, Alanson P. Brush, Charles Schmidt and various reissues, covering anti-friction bearings in front axles, rear axles on removable pinion mounting, adjustment of bevel gears, rear axle construction, bevel gear driven and compensating mechanism, adjustment of bevel gearing, rear axle transmission, etc., which are owned or controlled by the three companies concerned. With a view of eliminating possibility of conflict or controversy the company was projected and organized. The company has issued licenses to manufacture under its patents, and it is understood that it will continue this policy.

"SETBACK" BY UTTERBACK.

When the city council of Des Moines, Ia., enacted an ordinance that prohibited an automobile standing at a curbing more than 20 minutes, there was rejoicing by those who did not own vehicles, and consternation followed when the police arrested a number of citizens who sinned to the extent of a few minutes. The defendants appeared before Judge Utterback in the police court, who discharged them, claiming that as he interpreted the law the legislature did not delegate to the city council the authority to specify what period of time a car should be left standing at a street curbing. Now the citizens who own machines have somewhat regained their composure and the advocates of the ordinance are correspondingly depressed.

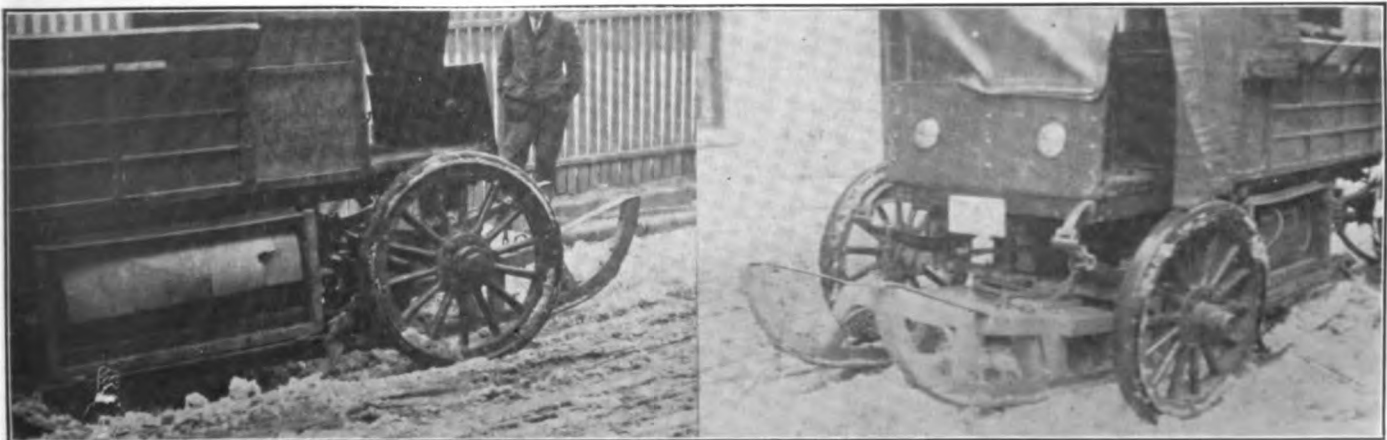
ELECTRIC WAGON ON RUNNERS.**Interesting Experiments by Hartford Engineer During Snow Blockade.**

The heavy snow storms of February accumulated more than 18 inches of "the beautiful" in the streets of Hartford, Conn., and as this was on a level the additions from sidewalk paths and from the car track plowing added considerably to the depth of the normal precipitation. In all the streets not plowed by the street railway company haulage was done with extreme difficulty for a considerable period of time, and the experience with motor vehicles was that the snow would not permit sufficient traction to make good headway, especially where the streets had not been plowed.

All vehicles that were propelled by the rear wheels, when driven into deep snow, especially if the depth was such that it reached the dust pans or the running boards, were held above the ground and the snow afforded but little traction, even with chains. In many instances the snow was pushed along until the body "rode" it, and the rear wheels were gradually lifted free and revolved without result.

Willis M. Thayer, manager of vehicle sales of the Hartford Electric Light Company, whose company is agent for General Vehicle electric machines, made some decidedly interesting experiments with runners attached to an electric wagon, and while he did not work out what he believes to be ideal equipment, he is of the opinion that with the results obtained he can build what will be in every way practical for use in such conditions as obtained in Hartford.

The machine was a one-ton wagon with an under-slung battery box, which has a clearance of about 11 inches, and this was found to push the snow ahead of it when the rear wheels had traction, although the weight was such as to prevent the wagon "riding" the packed snow to the same extent as might have been experienced with a vehicle with dust pan and running boards. With a view of carrying the front wheels on



Using an Electric Wagon with Sleds in Deep Snow, an Experiment Made at Hartford, Conn.: At Left, the Runners Under the Battery Box Are Shown, and at Right the Arrangement of the Forward Sled, Which Was Turned by the Hand Wheel and Steered the Machine Equally as Well as When Running on Wheels.

top of the snow, a "bob" was constructed that was attached between the front wheels, and so coupled that it could be turned with the steering wheel, the weight of the wagon being carried on this. The sled or set of runners was a frame with shoes about 2.5 inches wide and perhaps four feet length, the frames being braced with cross members and rods. A second set of runners was built and attached rigidly under the battery box.

The outfit was tested in deep snow and the forward construction was found to be in every way practical, although the runners ought to be further apart. The runners were apparently of sufficient area to support the forward end of the wagon, for one of the accompanying illustrations is from a photograph made where the snow was at least a foot deep and the wheels are carried well above the surface. With this the wagon steered perfectly and was steady and dependable so far as control was concerned.

The experience with the runners under the battery box was that they were too far forward and too narrow. Being firmly attached, when deep snow was reached the runners mounted on the surface if it were hard, or did not sufficiently support the machine if the snow was soft. Careful observation and numerous tests convinced Mr. Thayer that it would be practical to mount a rear sled with wider runners further back and on springs, so that while the runners would partially support the battery the rear wheels would sink sufficiently into the snow to afford traction.

As arranged the front sled was so mounted that the runners cleared the surface about two inches when the wagon was running on its wheels, and the runners under the battery box were designed to have about the same clearance. Mounted on the rear axle they would probably require more clearance, possibly four or five inches, but the results with such installation were not determined because of lack of time. Mr. Thayer believes that the use of runners is thoroughly practicable and that with such adaptation the trucks could be driven in exceedingly deep snow.

TRUCKS IN TELEPHONE SERVICE.

The Bell Telephone Company, Philadelphia, Penn., has taken delivery of three White 3000-pound wagons that are equipped with bodies suited for the use of its construction department. The company now has 24 White machines in its service, two of which are five-ton trucks equipped with double-power winches, which are used for hauling cable through conduits. When this order was filled a delivery of three machines was made to the Southern Bell Telephone Company.

The Mogul Motor Truck Company has been organized at St. Louis, Mo., under the Missouri law, with capital of \$100,000, by George C. Griffith, P. R. Walsh, Julius Berninghaus, C. S. Cobb, J. T. Hick and George W. Hunter.

S. A. E. COMMITTEES.

The following division chairmen have been appointed by the chairman of the standards committee of the Society of Automobile Engineers, Henry Souther, and these executives will arrange the meetings of the groups during the coming year: Aluminum and copper alloys division, William H. Barr, Lumen Bearing Company; ball and roller bearings division, Howard Marmon, Nordyke & Marmon Company; broaches division, C. W. Spicer, Spicer Manufacturing Company; carburetor fitting division, G. G. Behn, Hudson Motor Car Company; commercial car wheels division, William P. Kennedy, consulting engineer; data sheet division, B. D. Gray, Hess-Bright Manufacturing Company; electrical equipment division, A. L. Riker, Locomobile Company of America; electric vehicle division, J. R. Coleman, Atterbury Motor Car Company; frame division, J. G. Perrin, Lozier Motor Company; iron and steel division, Henry Souther; lock washer division, J. E. Wilson, National Lock Washer Company; miscellaneous division, J. G. Utz, Perfection Spring Company; motor testing division, J. O. Heinze, Northway Motor & Manufacturing Company; nomenclature division, Arthur B. Cumner, consulting engineer; pleasure car wheels division, Henry Souther, consulting engineer; research division, David L. Gallup, Worcester Polytechnic Institute; seamless steel tubes division, H. W. Alden, Timken-Detroit Axle Company; springs division, Harold L. Pope, Pope Manufacturing Company; truck standards division, William P. Kennedy, consulting engineer.

The following meetings of the divisions have been announced: Iron and steel division, March 10; springs division, March 17; broaches division, March 24; electric vehicle division, March 31; standards committee, April 7-9; research division, April 21; electrical equipment division, May 5; ball and roller bearings division, May 12; motor testing division, May 14.

A branch of the General Vehicle Company has been established at 327 Main street, Springfield, Mass., which is in charge of Preston T. Miller as manager. The interest in electric vehicles in that city and vicinity has impelled the company to have direct representation there.

The Lawter Tractor Company has been incorporated at St. Marys, O., with capital of \$125,000, to manufacture motors and power propelled machines of all kinds. The incorporators are L. C. Meeley, A. Herzog, H. E. Jennings, O. Carpenter and Hobart Scott.

The Irwin Motor Truck Company has been incorporated with capital of \$500,000 by Murray Irwin, who was sales manager of the Lewis Spring & Axle Company, and the purpose is to establish a factory at Marshall, Mich.

THE FARR TRUCK TRANSMISSION GEARSET.

A PATENT has been granted to Herman G. Farr, a mechanical engineer of Springfield, Mass., who has assigned this to the Knox Automobile Company, which covers the construction of a motor vehicle power transmission gearset, designed for use with machines built for freight service. The gearset is a conventional type with sliding gears that may be selected at will so as to afford any desired speed ratio, but as designed it is intended for incorporation with a differential casing such as is constructed for the jackshaft of the chain driven machine, and assumedly is not combined with rear axles of the floating construction.

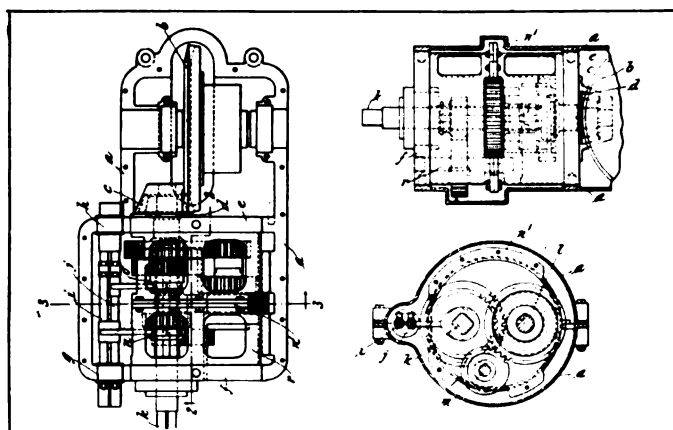
The gearset and differential casing are divided longitudinally, the lower section carrying the gearset and the differential gearing, the upper portion being practically a cover. The gearset itself is built with the main shaft and the countershaft paralleling at the same height, with the reverse stud shaft carried below, the main shaft carrying the movable gears, which are coupled by dog clutches. The gearset does not differ in the constructional details from the conventional type up to this point, but instead of the bearings carrying the shafts being mounted in the end walls of the casing the case carries a frame in which the entire gearset, including the pinion shaft, is mounted. This frame or cage is in two parts and is bolted together at a point near the centre, the frame members being substantial in construction and designed to endure under heavy stresses.

The ends or head members of the frame are fitted accurately into the casing, so that the gearset as an assembly is rigidly supported, and these are retained in the case by substantial studs that are inserted externally through the case. When assembled the frame is practically a part of the case, but by the removal of the cover of the case and the retaining bolts the frame with the shafts, bearings, gears and pinions may be removed from the casing. The value of the construction is that with comparatively little labor the gearset may be taken from the case for examination, and it may be placed on a bench practically operable, when it can be tested, and if repair is necessary it can be assembled and tried before being placed in the casing.

The removal of the gearset as an assembly is known to be a decided saving in labor, as well as an insurance that it is operative, while all parts can be worked on with much greater ease and rapidity while on a bench than in the vehicle. The clearing of the case of the gearset also makes practical and easier the work that may be necessary with the differential, so that this need not be removed save for repair, as adjustment can be easily made, and the casing can be completely cleaned without much labor and with assurance that the gearset will be in perfect condition when restored to the case. The removal of the cover

section of the case affords the same access that is had with the ordinary construction, and should there be need the gearset may be taken out with comparative ease.

In the drawings reproduced, a is the gearset and differential case, b the differential, c the extension of the rear head to support the main shaft bearing, d the bevel gear of the jackshaft, e and f the head members of the gearset frame, g and h the supporting members for the gear shifting rods, i and j the gear shifting rods, k the main shaft, l the countershaft, m the reverse stud shaft, n and o the gear clutches, n' the frame or cage connection flanges, and r the frame or cage. The accompanying illustration of the gearset is very comprehensive, as it gives the detail of construction clearly. The top or plan view is of the gearset assembled in the case and as a unit with the differential gearing, for the removal of the cover exposes every part of the assembly, and the end or frame mem-



The Farr Transmission Gearset: At Left, Plan View, Showing Combination with Differential; at Right, Top, Longitudinal Section at the Figures 2—2; Bottom, Transverse Section at the Figures 3—3.

bers that contain the gearset can be noted as supplying the conventional solid ends of the casing. Aside from this sectional design the case conforms to ordinary construction. Turning to the upper right sketch in the illustration it will be noted that this is a vertical longitudinal section, at the points designed as 2—2 in the plan view, and this indicates the end members and the stud bolts retaining them, as well as the flanges of the frame, which are bolted together directly over and under the gear, the flanges forming a web that materially stiffen the frame when assembled. It will be seen that the end members are heavily constructed and intended to endure hard service. The lower right sketch is a transverse section at the flanges of the frame, at the point indicated in the plan view as 3—3, this indicating the relative positions of the shafts and gears.

New agents for the Koehler ton delivery wagons are D. H. Haskins, Newburn, N. C.; Hanover Street garage, Manchester, N. H.; H. Curtis Krout, New Freedom, Penn., and Cochran & Co., Cincinnati, O.

TRUCK IS "BEST INVESTMENT".

Striking Economy of Motor Vehicle in Wholesale Paper Distribution.

A remarkable instance of efficiency and economy is afforded by the experience of the J. & F. B. Garrett Company, Syracuse, N. Y., wholesale dealer in paper and printers' supplies, which has for a considerable length of time used a Palmer-Moore 1600-pound delivery wagon in its city delivery. Syracuse has a population of about 150,000, and it is the commercial centre of a large section of central New York State. Some portions of the city are well elevated and many of the streets have long grades, while at certain periods of the year the unpaved streets are deep with mud, these conditions making haulage with animals somewhat more expensive than might be assumed.

The J. & F. B. Garrett Company makes distribution throughout the city and into the suburbs, and had maintained its own delivery service until last year, when the motor wagon was purchased. During the past winter more snow fell in New York State than for 30 years, and this condition tested the machine to an unusual degree, as for weeks the streets were deep with snow and delivery was made without unusual effort. In February, in response to a request for an opinion as to the results that had been obtained with the machine, the president of the company stated, "Our truck is the best investment we have ever made".

In connection with this, the statement was made that the experience of the company had absolutely convinced it of the desirability of motor vehicle delivery, and, upon reflection, that the company had continued with horse vehicles as long as it did was a source of wonder. By this was meant that economy of the motor delivery wagon was considered established beyond question. Up to that time the upkeep

cost of the machine, including the driver's wages, was but \$1 a week more than had been expended for a single unit of the horse delivery, including the salary of the driver.

But the machine was used to do the work of two and sometimes three horse wagons, and while the goods are bulky and not easy to handle, a load will average 1200 pounds, and the average day's driving is approximately 40 miles. An example of possibilities with a machine is cited in making 18 deliveries after 4 in the afternoon, which was easily done despite adverse conditions.

ROBERTS SELLS STANDARDS.

The Standard Motor Truck Company of Ohio, maker of Standard delivery wagons, with factories at Warren, O., and executive offices at Cleveland, O., has appointed W. M. Roberts, formerly general sales manager for the Stewart Iron Works Company of Cincinnati, O., as general sales manager, and he will supervise all sales in this country and abroad. He has established headquarters at the Cleveland office.

The Standard machines are made in 2000, 3000 and 4000-pound sizes and are to be produced in large numbers as soon as the additions to the Warren factories, which will provide for an increase of 400 per cent. in production, are completed. The plans for the new buildings have been accepted and the work is now in progress.

NOVEL TIME PAYMENT PLAN.

The Gerlinger Motor Car Company, Portland, Ore., which has branches in several cities in Washington and Oregon, has developed a plan for time payments which it is maintained will be satisfactory and work out to the benefit of all concerned. This applies

to all of the agents for the company who sell trucks on time payments, receiving notes for the balance remaining unpaid. Instead of the agents holding the notes these are purchased by the Gerlinger Motor Car Company, charging for this a nominal amount. Thus the company holds notes that are made payable to the sub-agents, instead of holding them as direct payments, the benefit being that the sub-agent can deal with those who wish to make time payments and need not himself invest his own capital. This plan is said to greatly increase the sub-agents' opportunities for business.



Palmer-Moore 1600-Pound Delivery Wagon, with Four-Post Body and Air-Cooled Motor. Used in City Work by the J. & F. B. Garrett Company, Syracuse, N. Y.

ELECTRIC COMMERCIAL VEHICLE TIRES.

"ELECTRIC Commercial Vehicle Tires" was the title of a paper, illustrated by curves and diagrams shown on a screen, which was read by F. R. Whitney to the members of the Electric Vehicle Association of America the evening of Feb. 24, at the headquarters of the organization in the United Engineering Societies' building, 29 West 39th street, New York City. Mr. Whitney is chief engineer of the Commercial Truck Company of America of Philadelphia, and he has devoted much study to the subject of tires and their influence on vehicle service. Few men have made as careful investigation of this subject as he, and his observations have been noted with extreme care.

Naturally, the paper was given over to consideration of the solid or band and block types used for service vehicles, and pneumatic shoes were only referred to incidentally or for comparisons only, and should not be understood as being the subject of his tests or experiments. Mr. Whitney has devised instruments for tire testing and his experience has extended over a considerable period of time, so his conclusions may be regarded as being fundamentally sound and not with a view of favoring any particular type. Mr. Whitney's paper was in part:

The principal causes of the recent rapid rise in popularity of electric vehicles has been due to the fitness of the electric vehicle for city work and to marked improvement in essential features as ball and roller bearings instead of plain; batteries with largely increased capacity and reduced weight; reduced maintenance cost; reduced cost of electricity and increase in number of charging stations; better and more efficient motors and types of gearing; and last, but not least, greatly increased tire life and, in addition, increased effective quality of the rubber.

Items Affecting Operation Cont.

The items affecting the cost of operation of electric vehicles have within the last 10 years undergone changes approximately as follows:

Battery—Weight reduced, 30 per cent.; capacity increased, 25 per cent.; life increased, 50 to 150 per cent. **Tires**—Life increased, 100 per cent.; cost reduced, 50 per cent. **Mechanical parts**—Life increased, 100 to 500 per cent.; transmission, gearing, bearings, etc., weight reduced, 30 to 50 per cent.; efficiency increased, 50 per cent. **Current rates**—Reduced, 50 to 75 per cent.

The purpose of this paper is to briefly outline several interesting features noted in studying the tire question and the consequent effect on the performance of the vehicle. The prevailing types now on the market can be divided into two distinct types, viz., endless and block, and further sub-divided into five classes.

There are reasonable arguments as to the advantages of each class, and as all classes are in general use, there must be merit in each, the general drift at the present time, however, seems to favor the hard rubber base tire.

Points to Be Considered.

In selecting tires best suited for any particular case, there are five points to be considered from the point of view of the electric vehicle user, and I place them in the following order: First, efficiency; second, durability; third, resiliency; fourth, weight; fifth, cost.

With tires, the most efficient is the one that will roll along the road and offer the least resistance to rolling. A well designed truck with good tires will show a current consumption of say 35 watts per 1000-pound mile, and of this total of 35 watts from 20 to 25 are absorbed in the tires alone, leaving the remaining 15 to 20 distributed between bearings, gearing, motor loss, windage, etc. A change in tires on this same truck could easily increase the current consumption to 50 watts per 1000-pound mile, or in comparison in miles on one charge of the battery the truck in the first case would cover say 50 miles on one charge of the battery as against 35 in the second case.

Methods of Efficiency Test.

Several methods of efficiency test which have been found most satisfactory are as follows:

First, bounce test, which consists in dropping a piece of hard material on the tire from a definite height and measuring the height it will rebound. The proportion of the rebound to

the total height will represent the efficiency of the tire, and although this is simply a comparative test, the results secured have been reasonably accurate and the test is quickly taken with tires either on or off the wheel.

Second, coasting test, allowing the vehicle to coast down a known grade and determine the distance it will run, this being repeated with different makes of tires; the more efficient tire will coast farther. This test involves changing wheels and to be accurate should be repeated under identical conditions and one test should follow the other as closely as possible.

Third, running test, which is made by running the vehicle over a measured course and with proper instruments and stop watch determine the power consumed in terms of watt-hours per ton or 1000-pound mile.

Fourth, towing test, with traction dynamometer. This consists in towing the vehicle over a definite course in both directions and observing the draw bar pull required. This is an accurate test and easily taken, but has the disadvantage of requiring the second vehicle and more men.

Fifth, dynamometer test, which consists in mounting the tire to be tested and rolling it against a steel tired wheel, the resistance to rolling being determined in pounds at various speeds and pressures.

Mr. Whitney illustrated these tests by elaborately plotted curves showing results. From them he concluded that a vehicle equipped with one specified tire would cover, say, 50 miles on one charge of the battery, whereas a vehicle equipped with another indicated, over the same route and using the same battery equipment, would be able to cover only 30 to 35 miles. He continued:

The question of durability is important, as the cost of laying up a truck to have tire changes made involves considerable expense as well as inconveniences. For this reason a high priced tire that will run 10,000 miles is a decidedly better proposition than a tire costing 20 per cent. less which will only give 8000 miles of service.

Value of Resiliency.

Resiliency is frequently used as referring to tire efficiency and indicates the amount the tire will depress under a given load, and its value is in the cushioning effect. The amount of cushion which the tire interposes between the wheel and the road is an important factor in the value of the tire as measuring the amount of injurious vibration and shocks which are absorbed.

It is interesting to note that usually the first idea is that the heel of the blocks is worn out first, but, as a matter of fact, the toe is worn more on account of its creeping out from under the load as the wheel revolves. It is frequently contended that block tires eliminate the wave in front and consequently are more efficient than endless tires. This is a fallacy, however, as the wave, instead of being continuous, is broken by each block, and very careful tests for efficiency have shown conclusively that with rubber of the same compound the efficiency test is the same.

Importance of Weight.

The question of weight is usually given consideration by the vehicle manufacturer, but the tire manufacturer and the user do not seem to appreciate the importance of reduction in weight, as is evidenced by the fact that practically all of the tire manufacturers in producing their hard base designs have applied an intermediate band to the wheel simply for the purpose of securing the tire, although the added weight from this band on a set of wheels for a five-ton truck amounts to approximately 400 pounds, and the cost of hauling this 400 pounds—which is approximately 2.5 per cent. of the weight of the truck carrying average load—around for one year amounts to \$40, which figure is arrived at by taking the cost of tires, battery and current for one year, so that no further argument is needed to emphasize the importance of keeping the tire weight down and eliminating all unnecessary weight in the attachments.

The cost of tires should not be taken as the controlling factor, as 10 or 20 per cent. difference in tire cost can easily be offset in other items of expense.

Tests made to determine the effect of temperature upon tire efficiency show that the efficiency is materially reduced in dropping from 100 degrees to 50 degrees. Observations made on this point show that taking a cold tire, which will test, say, 50, and after giving it a number of hammer blows in the same place, the same tire will test several points higher, although the temperature has not been materially increased.

The Hearsey-Willis Company, Indianapolis, Ind., has been named as the selling agent for New Departure ball bearings for the central section of Indiana, and will carry a considerable stock of all types at its place of business.

FEDERAL ROAD SUPERVISION.

Government Officials and Highway Contractors to Select Route to Develop.

The federal government is not committed to any policy with reference to the improvement of highways, and up to the present time Congress has made no appropriation for road development, aside from that necessary in the administration of the federal districts of Alaska or Columbia. The office of public roads of the Department of Agriculture was created with a view of collating and supplying information that might be of interest to state and municipal road builders. In connection with this limited experimental work has been done for a number of years.

Several bills have been introduced into Congress providing for national aid in road development, but these have generally provided for appropriations. No federal policy has been established with reference to highway building, and the policies of the different states have not been defined. The different national and state bodies devoted to the promotion of road development are generally united as to purpose, but are widely apart so far as engineering, use of materials, supervision, maintenance and other details are concerned. Strangely enough no real system has ever been determined with reference to these essential factors.

The first move that will lead to a concentration of policy and endeavor was inaugurated recently when a party of representatives of the office of public roads and officials of the American Highway Association and from the highway departments of several states was driven from Washington to Atlanta, Ga., over a route which was selected with a view of systematically improving it under the supervision of engineers attached to the office of public roads.

The purpose of the offer of federal supervision is to demonstrate to the states, counties, towns and cities through which the route is laid out, the value of uniform construction and maintenance, and to determine the merit of standards that have been tentatively adopted by the office in its advisory relations with the people. The belief is that co-operation of the federal and state officials can lead to uniformity of road improvement, and the purpose of having the work cover a distance of approximately 850 miles is to show that the policy can be applied to road building in general and to deal with as varied character of construction and maintenance as is possible.

The activity of the office of public roads resulted from a conference of Director Logan Waller Page, Chairman Leonard Tufts of the special committee of the American Highway Association, that had been appointed by the organization to promote the work, and Executive Secretary J. E. Pennypacker of the association, and the determination of Mr. Page to assign three of the best engineers of his department to super-

vise the highways included in the route. But their service was conditional upon the American Highway Association securing the co-operation of the highway departments of the different states. The state officials were enthusiastic when conferred with and their advocacy determined the proposition. While not definitely decided, one engineer will probably have oversight of the work from Washington across the District of Columbia and Virginia to the North Carolina line, the second the work in North Carolina, and the third the work in South Carolina and Georgia.

The officers of the American Highway Association maintain that substantial demonstration will have very large practical value, and will bring more beneficial results than theoretical stimulation, but this will be applied more to the section of the country in which the route is located. Of course time will be necessary to determine the results. The association has arranged for automobiles being placed at the command of the officers who shall supervise the roads, that they may have the means of reaching whatever section may be necessary.

The party that first drove over the roads to be dealt with included Capt. P. St. J. Wilson, assistant director of the office of public roads; Mr. Tufts, Mr. Pennypacker and the representatives of the highway departments of Virginia, North Carolina, South Carolina and Georgia. Where desirable, meetings were arranged with citizens and local officials, and plans made for the surrender of the control of the roads during the time of supervision and the expenditure of the available funds under the direction of the engineers. While locality policies have been encountered, the belief exists that with the assurance that the government officers will wisely and practically expend the money ordinarily raised for improvement, and the fact that the roads will be the subject of national interest, interested co-operation will be given by all committees.

The Whitford Corporation, with capital of \$25,000, has been incorporated at Woodport, N. Y., by Charles E. Whitford and Charles S. Gaywood of Weedsport and Thomas M. Osborne of Auburn, N. Y., for the purpose of manufacturing motor trucks.

Peacock Bros., 2841 Broadway, Oakland, Cal.; C. C. Misner, 15 Kentucky street, Petaluma, Cal., and C. E. Shannon, 125 Mill street, Rochester, N. Y., have been made agents for the Adams Bros. Company, Findlay, O., maker of the Adams trucks.

Motor truck bodies will be the specialized production of the Bee Automobile Company, Allentown, Penn., which was recently established by Reuben H. Bachman, Peter Bradbury and Francis Bachman.

D. R. Harrington has resigned from the Universal Motor Truck Company, Detroit, Mich., and has associated himself with the International Cyclecar Company.

STREET CLEANING COST IS DECREASING.

Reports from London and Chicago Indicate Important Effect of Wider Use of Automobiles and Trucks---News in the Municipal Service Vehicle Field.

IT WAS shown recently in these columns, by analysis of the figures given in the official report of the commissioner of public works and the civil service commission of Chicago, that the substitution of motor vehicles for all the horse drawn wagons in use in that city would result in a saving of \$1,000,000 a year in street cleaning expense alone. Attention is drawn to this situation by the National Automobile Chamber of Commerce, commercial vehicle section, in reviewing figures made public respecting street cleaning costs in London, England, as a result of the decrease in horse drawn vehicles and the abandonment of water bound macadam pavement.

The official table of reductions in street cleaning expense (translated from pounds to dollars), which have occurred in six years in half a dozen large boroughs in London, is published as convincing proof of these statements by a writer in the Pall Mall Gazette, a copy of which was brought to this country recently by John A. Wilson, president of the American Automobile Association. The table follows:

Cost of Street Cleaning in London.

Borough	1905-6	1911-12	Decrease a Mile
Battersea	\$144,350	\$105,765	\$540
Chelsea	69,435	53,850	540
Fulham	85,285	60,720	530
Paddington	151,785	114,855	620
Westminster	433,700	345,120	895
Wadsworth	221,930	159,460	470

Decreases were reported in 17 other boroughs, and it was shown that it cost an average of \$1700 a mile for street cleaning in 1905-6 as compared with \$1480 in 1911-12, a saving of \$220 a mile on 2154 miles of streets, or an aggregate of \$473,800 annually.

Corroborative evidence that the cost of street cleaning is decreasing is found in the records of the Citizens' Street Cleaning Bureau of Chicago, an organization made up of property owners and business men in the First ward. The bureau is engaged in cleaning streets and alleys, flushing, sprinkling, snow removal, cleaning catch basins and removing ashes in the loop district. It cleans approximately 119,000 square yards of streets and 20,000 square yards of alleys. The figures presented in a table below show how the cost of cleaning streets has decreased steadily during the six years from 1907 to 1912:

Some very interesting deductions may be made from a study of the table. It will be noted that there has been an actual decrease of more than \$12,000 a year in the cost of sweeping

and removing refuse, although the expense for the alleys has increased. It may be added that the cost of snow removal has more than doubled, from \$11,343 to \$24,430 a year, while that of sprinkling has been increased from \$640 to \$6464 a year. The total in question follows:

Cost of Street Cleaning in First Ward, Chicago.

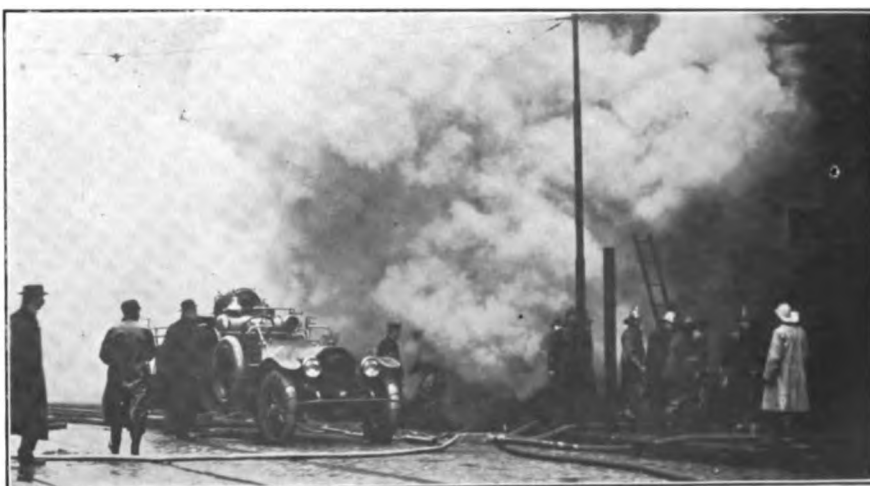
Year	Cleaning		Carting		Totals
	Streets	Alleys	Streets	Alleys	
1907	\$39,767	\$3581	\$7756	\$1457	\$52,561
1908	33,942	3404	7501	1830	46,677
1909	31,865	3379	7620	1687	44,551
1911	30,370	3450	5936	766	40,522
1910	31,531	2917	7674	690	42,812
1912	29,172	3485	6399	813	39,869

PEERLESS FIRE APPARATUS.

The city officials of Cleveland, O., recently expended \$100,000 in equipping the fire department with motorized apparatus, made by the Peerless Motor Car Company of that city. Included among these vehicles was a rebuilt steam fire engine, the Peerless company utilizing the old boiler, pump, etc., in remounting it on a regulation Peerless truck chassis.

This was decidedly in the nature of an experiment, but, in the opinion of Safety Director Benesch, who witnessed a demonstration of the rebuilt steamer, it is quite as efficient as the gasoline pumping engine which the department recently acquired, while the expense of making the change figured out at about half that paid for the other type of machine.

An accompanying illustration shows one of the new Peerless combination chemical engine and hose wagons at work at a recent fire. This type of machine has met with very ready acceptance, the Peerless company having installed a number in cities in Ohio, Illi-



Peerless Combination Hose and Chemical Wagon at Work on Recent Fire in Cleveland, O.

nois and Pennsylvania during the past few months. The company also makes a specialty of motorizing present horse drawn equipment of this character, thereby making a substantial saving to the municipality which may have serviceable equipment and desires to have it brought up-to-date.

MOTORS SAVE MONEY.

Mayor George M. Wright of Worcester, Mass., is an enthusiastic advocate of automobile equipment for municipal departments. He declares that they save money in each instance, to say nothing of the greater efficiency.

Worcester recently purchased and placed in service a new combination police patrol wagon and ambulance, made by the White Company, Cleveland, O., and four new motorcycles, for the police department; an American-La France hook and ladder truck for the fire department, and a Peerless five-ton truck fitted with a sprinkling apparatus for the street department.

Mayor Wright announces that the fire department has set aside sufficient money for the purchase of three more pieces of apparatus during the current year. He feels that no mistake has been made in selecting the American-La France truck, because the Panama-Pacific Exposition Company has ordered 12 pieces of apparatus of the same make for use during the world's fair in San Francisco in 1915.

He estimates that the new sprinkler will save not less than \$3000 for the street department this first year. It will be utilized for distributing oil and water on all streets and in new macadam work.

WELLESLEY COLLEGE FIRE.

The advantage of utilizing motor fire apparatus was particularly noticeable as a result of the recent fire which destroyed a large portion of the main building at Wellesley College, Wellesley, Mass. As the lo-

cal department was poorly equipped to handle a blaze of these proportions, aid was summoned from nearby towns and cities.

The City of Newton responded with its Knox pumping engine and a hook and ladder truck equipped with Knox-Martin tractor, both pieces having recently been supplied to that city by the Knox Automobile Company, Springfield, Mass. On account of confusion attendant at the fire the Newton department did not get the call until some time after the alarm had been sounded, but made a splendid run over the intervening six miles.

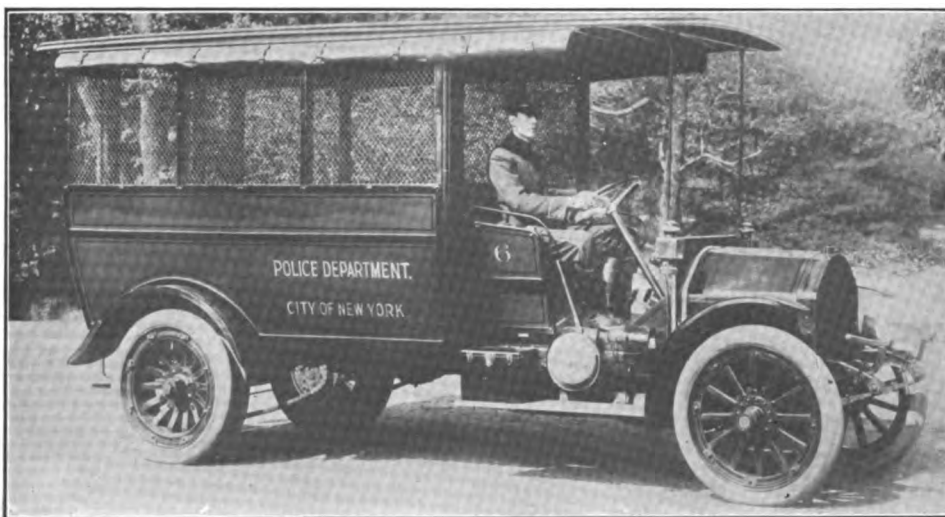
The pump was immediately coupled to a hydrant and worked steadily for over 3.5 hours, with two lines out, saving the right wing of the building. It was somewhat handicapped by lack of water, but in spite of this gave a handsome performance, making the first real hard test to which it had been subjected since its installation.

Apart from the demonstration of efficiency made by this vehicle, it is of interest to consider the possibilities for co-operation among cities and towns located near each other. Under similar circumstances, with equipment of this character it should prove entirely practicable for such towns to combine forces in the event of sudden need, so as to reduce the danger of conflagration to a decided minimum.

NEW YORK POLICE WAGONS.

Having proven to its entire satisfaction, by the experience of the past, that a medium capacity motor truck will save over twice its cost each year in police service, the New York City police department recently purchased 25 Willys-Utility 1500-pound wagons, fitted with patrol bodies. The sale was made through the R. & L. Company, New York distributor for these wagons, made by the Willys-Overland Company, Toledo, O.

One of the new patrols is shown herewith. They have special screen side bodies, mounted on a somewhat enlarged chassis. The regular wheelbase of 120 inches was increased to 144, and the interior provides seating accommodations for 12 people. These also is room for two persons on the driver's seat. The body dimensions are 110 inches length from the rear of the driver's seat, 70 inches height and 66 inches width inside. The rear entrance is 32 inches wide and the rear step 36 inches wide. The equipment includes curtains at the side and rear, a stretcher carried under the seat, dome light, siren horn, push pedal gong, oil side and tail lamps. The exte-



One of the 25 Patrol Wagons Recently Delivered to the New York City Police Department by the Willys-Overland Company.

rior finish is in green with the lettering in gold.

By advancing the governor, the speed is increased from 18 to 25 miles an hour. The motor has bore of 4.125 inches and stroke of 4.5. Axles are drop forged, with Timken bearings in the hubs. The tires are 36 by 4.5 inches, single in front and dual in the rear, pneumatics mounted on quick detachable rims. The gasoline capacity is 15 gallons.

According to John N. Willys, president of the Willys-Overland Company, the main reason why the New York department chose these vehicles, on which the company is now specializing, was the showing made by 13 Garford wagons of a similar capacity in that service during the past two years.

NEWS FROM VARIOUS CITIES.

Ten Whites in Baltimore—Among the municipal sales recently made by the White Company, Cleveland, O., is that of two three-ton chassis fitted with fire apparatus to the department in Baltimore, Md. This purchase gives the department in that city a total of 10 White machines.

Will Not Ask for Bids—The city officials of Syracuse, N. Y., have practically decided not to ask for bids for the purchasing of three pieces of automobile apparatus which it is intended to place in station No. 1. Fire chiefs in other cities have intimated to the Syracuse department that it is not practicable to select fire equipment in this manner, since it often becomes necessary to take a machine of inferior ability because of a slight difference in price. Chief Quigley desires first of all to secure a six-cylinder tractor capable of hauling the heavy truck up the steepest hill in Syracuse, under any condition.

White in Ashes Disposal—The street cleaning department in New York City has been experimenting with a White dumping truck, made by the White Company, Cleveland, O., in handling ashes. Thus far, it has been able to do the work formerly done by five single-horse carts.

For Icy Roads—Chief George P. Cahoon of the fire department in Swampscott, Mass., has evolved what he believes to be a satisfactory method of starting motor apparatus on roads that are covered with snow or ice. He uses strips of rope matting about 18 inches wide, which are carried in a neatly rolled package. When the wheels cannot secure traction, the strips are laid on the snow or ice, when the tires grip them nicely. It is stated that the plan has been

tried under the most severe conditions, even where the road has been covered with hard, smooth ice, and always with success.

KisselKar in Fall River—An accompanying illustration presents the new KisselKar 60 horsepower combination chemical engine and hose wagon, made by the Kissel Motor Car Company, Hartford, Wis., and recently installed with the fire department in Fall River, Mass. The equipment is in every way complete, including two chemical tanks, basket for chemical hose, hand extinguishers, axes, etc., and plenty of room is available for carrying fire hose and the crew.

Adds to Motor Fleet—The board of public works in Indianapolis, Ind., has bought 12 additional machines for municipal service. Two of these are three-ton Kelly trucks, to be equipped with portable asphalt repair plants for use by the street department. Two are Buick wagons, for use by the field corps of the engineering department. The other purchases include four Buick and four Ford runabouts, for the heads of departments and inspectors.

In the Market—The following cities are considering the purchase of motor fire apparatus: Anacortes, Wash.; North Tonawanda, N. Y.; North Adams, Mass., chemical engine and hose wagon; Helena, Mont., combination hose and chemical; Lebanon, Penn., Union Fire Engine Company No. 1; Batavia, Ill., town meeting April 21, to decide upon bond issue; Fort Worth, Tex., one piece of apparatus each year until department is completely motorized; San Jose, Cal.; Alameda, Cal., tractor for hook and ladder truck; Rome, N. Y.; Bridgeport, Conn., tractors for all horse drawn apparatus; Lenox, Mass., triple combination pump, chemical and hose car; Montreal, Que., 85-foot aerial ladder, two hose wagons, four tractors and salvage car; Fayetteville, Ark.; Holland, Mich.; Bristol, Penn.; Altoona, Penn., \$50,000 loan authorized; Glen Ridge, N. J., hook and ladder truck; Scranton, Penn., appropriation of \$38,000.



KisselKar 60 Horsepower Combination Chemical Engine and Hose Wagon, Recently Installed in Fall River, Mass.

RENAULT FOUR-WHEEL DRIVE TRACTOR.

**Interesting New Design Incorporating Features Demanded by French Military Requirements
---Motor Equipped Farming Implements Revealed at Recent Agricultural Exhibition.**

ALTHOUGH it cannot be held that front wheel driven trucks and trailers are entirely new, machines of this type having been on the market both in

cased by an aluminum housing forming an extension to the gearbox. The lower half of this housing is fixed and the upper half is readily detachable. The arrangement allows the whole of the coupling and clutch withdrawing mechanism to run in oil, and has already been employed on other Renault truck models for more than a year.

Naturally, the gearbox is of special type. It affords four speeds forward and reverse, comprising usual primary and secondary shafts. On the primary is a central crown wheel engaging with pinion mounted on a shaft in the same vertical plane, this latter transmitting power through a front and rear

propeller shaft to the respective axles. Each of the propeller shafts has a universal joint at each end. The axles are of the well known Renault design, comprising a one-piece forging with a central cradle, and with a cast steel cover on the driving end and a detachable aluminum cover on the other.

Front Wheel Drive.

The front axle is bored out to receive the driving shafts, and, as the front wheels must steer as well as drive, there is an enclosed universal joint on the end of the shaft, within the steering pivot, as shown herewith, in the smallest illustration. Since a differential lock is necessary, this is provided by means of a lever in the change speed sector, with connections passing through the gearbox, left and right, to the two differentials, one on either end of the front axle.

There are three hand levers, as indicated, that at the left being the differential lock, that in the centre the change speed, and on the outside, the hand brake. The change speed lever also engages the capstan drive, which is at the left of the chassis, as viewed from the rear. The capstan itself is mounted on a heavy



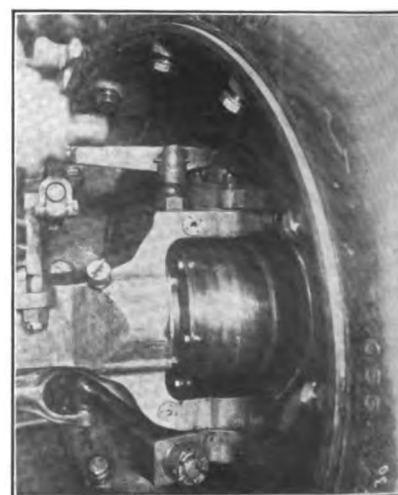
Renault Four-Wheel Drive Tractor and Two Trailers, Taking Part in the French Military Trials.

this country and abroad for a number of years, interest in them has been increased very materially of late, by reason of the prominence given them in the military trials in France last month. One of the newer designs is the Renault, made by Renault Freres, Billancourt, France, this having been built to comply with the army regulations, although in a general way it follows standard practise with this company.

The Renault pleasure car is well known in this country, and the truck bearing that name has been described fully in these columns. It is only necessary to state that the motor used in this newest vehicle is a four-cylinder unit, cast in pairs, with bore of 130 mm and stroke of 160 (5.1 by 6.29 inches). Cooling is by thermo-syphon, but instead of vanes on the flywheel and an air tight underpan, there is a fan at the back of the radiator, which is at the rear of the motor, as with all Renault machines, driven by belt running over a pulley just behind the flywheel. This fan is enclosed by an aluminum casing bolted to the rear of the dash, and has a central quick detachable cover to enable the driven pulley to be reached without taking down the entire casing. Louvers are cut in the rear portion of the bonnet, so that air can be drawn through the central radiator tubes, and a sheet metal V section guard is fitted between the rear cylinder and the cooler, so that the current of air going through the bonnet may be directed onto the central tubes and not onto the engine.

Clutch and Gearbox.

The clutch is of the inverted cone type, and there is a spring disc coupling between it and the gearbox. The whole of the mechanism between the two is en-



Universal Joint Arrangement in Renault Front Wheel Drive.

platform at the extreme rear, and is driven by shaft and enclosed worm gearing. In addition to the external contracting brake at the rear of the gearbox, there is an internal expanding brake in each of the four wheels.

Cast steel wheels are employed, these being fitted with solid twin tires, 1055 by 130 mm (41.5 by 5.5 inches). Provision also has been made for the attachment of tire chains by fitting a series of hooks at intervals on the inner face of the rim, which permit the chains to be hooked on quickly whenever it becomes necessary to use them over the soft ground.

Duplicate Steering Gear.

The steering gear is duplicated, of course. A worm on the steering column engages with a sector on a horizontal shaft, set just within the right frame member. This shaft has two worms, one of which engages with the sector carrying the lever arm for the front wheels, and the second with a corresponding sector and lever connected with the rear wheels. From these two points the control is exactly the same as on the ordinary models.

Suspension is by semi-elliptic springs, front and rear. Each of these has a sliding shackle at the rear, and is 5.5 inches wide. Towing hooks are fitted at the front of the chassis, and there is a quick action spring mounted coupling at the rear, and a very powerful sprag is hinged from the rear axle, in accordance with army requirements.

The largest illustration shows one of the Renault front drive tractors as fitted for competition in the military trials, hauling two trailers shod with steel tires. Aside from the Renault, the makes represented in this year's trials were: Panhard, Balachowsky et Caire, Blum-Latil, Schneider and Aries. The Panhard has a Knight engine and the Balachowsky et Caire is a gasoline-electric machine. The results of the tests, which are to be worked out with extreme care, have not been made public as yet.

LIVERPOOL DOCK PROBLEMS.

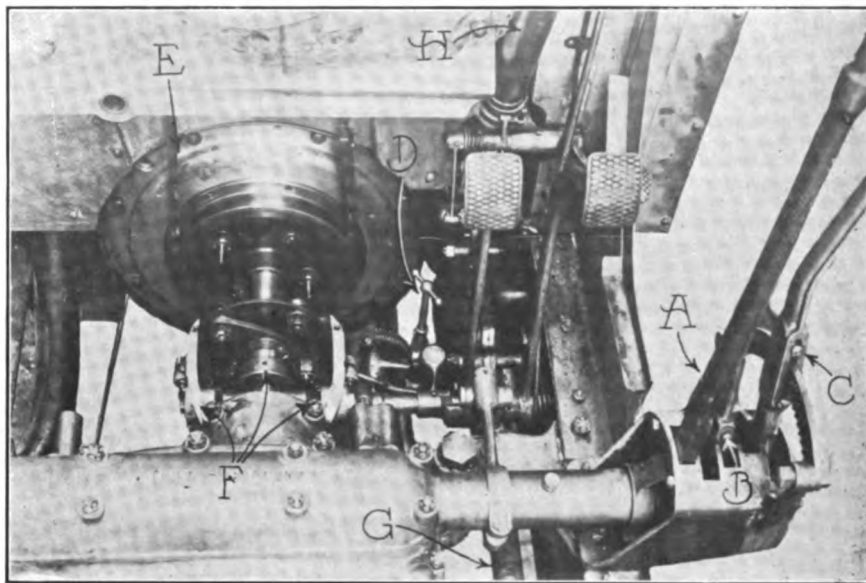
The Liverpool Self-Propelled Traffic Association in England has been conducting an investigation with respect to the congestion existing at the docks and railway terminals in Liverpool, with a view to suggesting suitable remedies. It is stated that the number of motor vehicles in use at these places at present is comparatively negligible, and the investigators express as their opinion that under existing conditions of loading at the ship's side and unloading at the warehouse or railway depot, motor trucks as such are not a paying proposition. This is due to the necessary

time required in waiting, loading and unloading, which forms such a large proportion of the total daily time available that the high first cost vehicle is "swamped by standing charges" in more senses than one.

Experimenting with Trailers.

Inasmuch as the members of the association are convinced that the motor vehicle is capable of offering the proper solution of the problem, an opinion in which business men and terminal authorities agree, the object of the investigation was to discover some method by which these could be employed with satisfactory results. After experimentation, it was found that with a truck and four trailers, one with the truck, one loading, one unloading and a fourth in reserve, it was possible to handle nine or 10 six-ton loads a day, over a round trip of three miles. With this plan, however, it was found that there was some loss of time in manoeuvring the trailers.

The investigators held that were it possible to re-



Constructional Details of Renault Four-Wheel Drive Tractor: A, Differential Locking Lever; B, Change Speed Lever; C, Brake Lever; D, Foot Brake Adjustment; E, Fan Belt Drive; F, Enclosed Disc Universal; G, Rear Wheel Drive Rod; H, Steering Column.

duce the loading and unloading speeds to an average of six tons a quarter-hour, it would only be necessary to increase the travelling speed one mile an hour, in order to accomplish practically the same work. The advantages of this plan were held to be: Less congestion, fewer vehicles, ability to operate in confined spaces, less total gross tonnage moving on the roads and less cost for haulage.

Loaded Truck and Trailer.

A third method suggested calls for the combined use of a truck carrying a load on its own body, and a trailer. Under this plan, it would be necessary to provide such facilities that both vehicles could be loaded and unloaded simultaneously, in order to maintain the same average speed, although under such favorable conditions it would be possible to handle a greater tonnage in two-thirds the number of journeys and at a still further reduced cost.

As a result of these investigations, it is understood that a movement is on foot to put all three systems to a definite trial, in order that it may be determined just which one of the three presents the best results. In this experiment the association must receive the co-operation of the terminal authorities. At present there is some indecision as to whether the vehicles to be utilized in the experimentation shall be propelled by steam, gasoline or electricity, and it is not at all unlikely that all three will be given opportunity to make the test in comparison.

AGRICULTURAL EXHIBITION.

Whether or not it is because the agriculturists of Europe are forced to give greater consideration to the so-called intensified farming, as has been stated by prominent foreigners who have visited America, it seems true that more attention has been paid to the matter of motorized agricultural machinery on the Continent than elsewhere. About four years ago the motor plow first made its appearance at the National agricultural show in France. Progress has been somewhat rapid, as indicated by recent Paris display.

Farm machinery was exhibited in the Esplanade des Invalides, and practically all of the available space was utilized. The list of self-propelled implements included not only plows of every description, but hoes, planters, mowing machines, etc., and tractors of various types.

Some of the machines shown have been described fully in these columns. Among these were the Stock self-contained plow, made in Germany, and the Bauche hoe, made in France, both of which have enjoyed a wide sale on the Continent, and have only recently been introduced in Great Britain. America was represented in the show by the International Harvester Company's kerosene tractor and the tractors made by J. I. Case Threshing Machine Company.

Moto-Aratrice Plow.

One of the most interesting new machines was the Moto-Aratrice, produced by Pavesi Tolotti, 18, Via

Oglio, Milan, Italy. In this an entirely new principle is involved, in that the plowshares are pushed instead of being pulled. It is made in two models, one being rated at 16-20 horsepower and the other at 40-50. The accompanying illustration is that of the 16-20 horsepower machine.

The front of the vehicle is mounted on a single, pivoted steering wheel, which is arranged to be raised or lowered to give the desired depth of the furrow. The two-cylinder slow running motor is placed at the driver's left, who sits over the gearbox. At the outer end of the shaft extending through the gearbox is a sprocket from which final drive is by chain to the right rear wheel. In this wheel is incorporated an eccentric drum or hub, which operates 12 stout shafts connected at their outer ends to double-pronged blades pivoted between the side plates of the wheel. The eccentric action of the wheel in motion causes these blades to project in order to provide traction. After leaving the ground the eccentric action causes them to lie flat with the tread, until they pass the top centre.

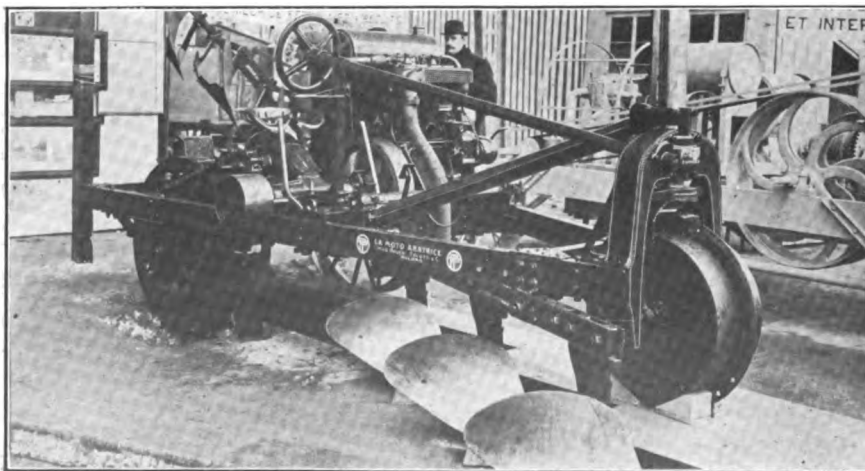
The left rear wheel is said to follow the last share in the furrow, although this is not clearly indicated by the illustration. Provision is made for lowering or raising the frame at that point to keep the vehicle in a horizontal plane, and a brass indicator shows the amount of deflection and therefore the depth of the furrow. It will be noted that the three shares are carried on a frame extension securely riveted to the right main frame member.

Amiot Tractor-Plow.

Another interesting machine shown was the Amiot, made by Henri Amiot, 50, Rue Lesage, Rheims, France. This is termed a combined tractor-plow, in that the share frame can be removed and the remainder of the vehicle utilized as a tractor for various purposes about the farm. In many respects it differs decidedly from standard practise in this type of equipment.

The motor is a four-cylinder Abeille, mounted at the forward end under a hood, with the radiator in front and the fuel tank at the rear. This is rated at 40 horsepower. Drive is practically direct, there being only one speed either forward or backward, and power is transmitted to the 70-inch rear wheels by side chains.

A feature of the machine is the provision for turning the furrow either to the right or left, thereby making it unnecessary to go around the entire plot. A strong rigid frame at the rear carries six plowshares, three being above and three below, as shown in the accompanying illustration. Above this is a crane like girder, carrying a pulley at its outer end, over which is led a chain, by means of which the plowshare frame is hoisted and low-



Moto Aratrice, an Italian Machine Which Pushes Plowshares Forward Instead of Pulling Them.

ered from the driver's seat by the engine's power.

At the forward end of the plowshare frame is a train of gears, also operated by the motor, by means of which this frame may be rotated so as to bring either set of shares into action. This frame also is made detachable by removing two bolts. A yoke is then substituted, converting the forward portion of the machine into a tractor.

Plissonnier Mowing Machine.

Among the mowing machines shown was an entirely new model, produced by S. Plissonnier, 234, Cours Lafayette, Lyons, France. The construction involves the use of a long frame, with a 6-8 horsepower motor mounted at the front, over a single pivoted wheel. The fuel tank is carried on a light support directly over the radiator, feed being by gravity. Power is transmitted by cone clutch and a gear-set, affording but one speed forward and reverse, to the rear axle.

The operator is located well back of the rear axle, steering being by a vertical column, connected by suitable linkage to the pivoted front wheel. The cutter bar can be raised or lowered by a long lever at the operator's right, this being arranged to automatically engage a special clutch for placing the knives into and out of action. The appearance is very neat and the construction is such as to permit of easy operation.

GENERAL NEWS FROM ABROAD.

New British Dumping Wagon—As the result of the special attention which has been paid to the matter of quick unloading in Great Britain, the maker of the Bussing wagon has evolved a new body, the interior of which is made with sloping floor. The lower half of the side, on both sides, is made to let down, when the contents are discharged by gravity. This particular body was constructed upon order for a St. Petersburg firm.

Weight Limit in Germany—According to the *Zentralblatt der Bauverwaltung* (Board of Works Central Gazette), Berlin, Germany, the following prohibitions will shortly be imposed on freight automobiles and omnibuses: Metal tires, a heavier pressure upon the driving axle than two-thirds of the whole weight of the vehicle, a maximum weight exceeding 8200 kilos, speeds above 16 kilometers an hour (about 20 miles), trailers weighing more than 4000 kilos, wheels with a diameter under 75 centimeters (about two feet six inches). It is also proposed to remit a part of the automobile tax on vehicles with wheels of 90 centimeters (about three feet) in diameter, and unable, by their construction, to travel at more than 30 kilometers (about 19 miles) an hour.

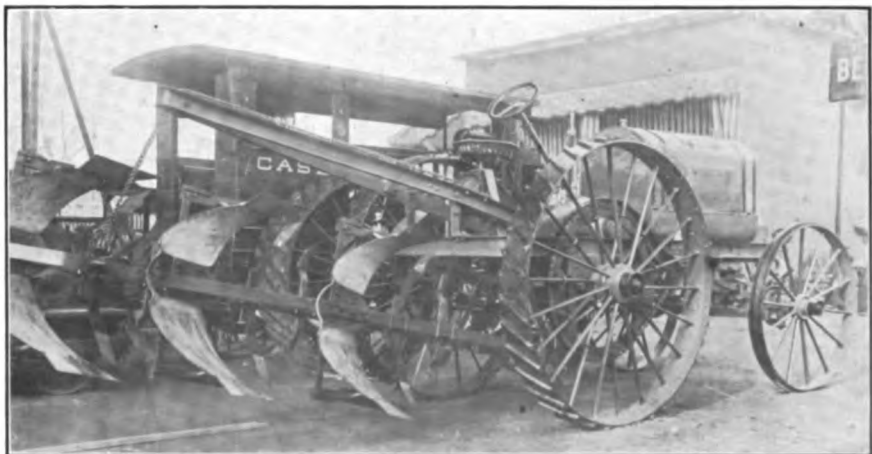
Taxicabs in Germany—According to a recent report there were 4156 taxicabs in Germany, 2332 of which were operated in Berlin, 388 in Munich, 312 in Hamburg, 127 in Cologne, 110 in Hanover, 104 in Leipzig and 103 in Frankfort.

Automobile Show in Denmark—The first organized exhibition of automobiles of all classes held in Denmark will take place in Copenhagen, April 18-20. It is expected that it will prove of decided value to the American manufacturers who have applied for space.

Delivering Locomotive by Truck—In view of the growing competition between highway haulage and railroads, it is of interest to note that the Maudslay company in Great Britain recently was called upon to transport a railway locomotive by road, it being contended by the builder that the motor truck was able to deliver its product at its destination in less time than it would take by rail.

Motor Trucks in Persia—As yet there are but two motor trucks in Persia, according to Consul-General C. W. Wadsworth of Teheran, although it is expected that a demand will arise shortly as the result of road work now contemplated by the government. A tin of gasoline containing about 100 pounds costs \$9 in Teheran. The expense of shipping a car to Persia, including the Persian duty of 10 per cent., is estimated at \$300, and the time required from New York is given as three months.

City Buys Omnibus Service—Subject to the approval of Parliament, Birmingham, England, proposes to purchase from the Birmingham & Midland Motor Omnibus Company some 30 motor 'buses, its garage and plant for \$165,000. This purchase would give the city the monopoly of the motor omnibus service within its boundaries, under an agreement that, while through 'buses from outside points may be run by the company into the city and by the city into the country, neither is to pick up any but through passengers within the limits of the other's activities.

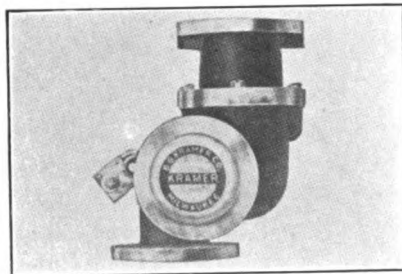


Amlot Combined Plow and Tractor, Indicating Novel Arrangement of Plowshare Frame.

New Commercial Car Accessories

Kramer Governor.

The B. G. Kramer Company, Milwaukee, Wis., is manufacturing the Kramer governor, which is especially for com-



mercial vehicles, where it is desired to limit their speed to a predetermined number of miles an hour. The device is also applicable to pleasure cars. The instrument is designed to control and maintain a constant speed of an internal combustion engine by governing the velocity of the incoming gases.

It comprises a throttle, connected to a disc member, that is allowed to float under a constant spring tension in a tapered conduit, the tension of the spring determining the maximum motor speed. Upon the velocity of the incoming gases changing, due to variation in engine speed, the position of the disc in the conduit is affected. This results in altering the position of the throttle, allowing more or less mixture, as the case may be, to be fed to the cylinders, and as the condition may require.

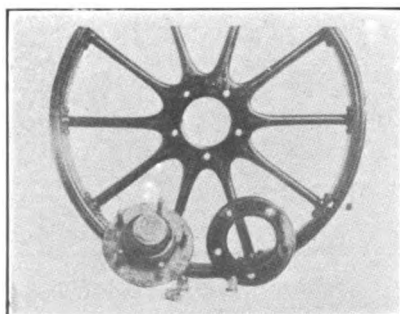
An auxiliary control lever is provided, permitting the driver to obtain any variation of speed up to the maximum afforded by the governor. It is pointed out that not only does the device make for efficiency and economy of fuel, but it cannot be tampered with.

Crown Prince Wheels.

The use of pressed steel in motor car construction is becoming more general and a new application of the material, at least in this country, is noted in the Crown Prince pressed steel wheels, which are being marketed by Max Bacham, 845 Jefferson avenue, East, Detroit.

It is held that they are 200 per cent. stronger than wooden members, lighter, and considerably more durable. It is also claimed that much more tire mileage is obtained and that greater speed is possible. One of the qualities of the design emphasized is that it will not collapse; merely bend when subjected to severe stresses which would break wooden constructions. Being of metal the Crown Prince design cannot shrink or the spokes become loose.

The Crown Prince is a demountable wheel, and it is stated that it may be removed and an extra member is easily fitted in about a minute's time.

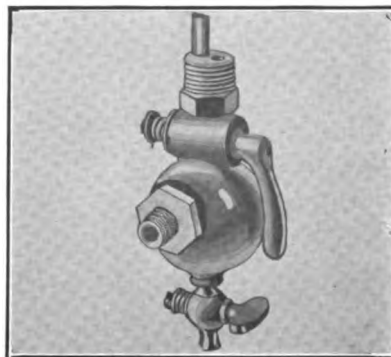


Trio Filter.

The Trio Manufacturing Company, 1206 Bellevue avenue, Detroit, is marketing a combination sediment trap and gasoline reserve supply device which is intended to eliminate the necessity for carrying extra fuel. It is designed especially for those cars not equipped with auxiliary fuel tanks, and the maker states that the Trio not only insures a reserve supply of fuel, but makes a rigid tank connection.

It has a sediment trap to catch all foreign elements, and is also provided with a positive shut-off to the carburetor. A petcock at the bottom of the Trio permits of drawing fuel for priming purposes, etc.

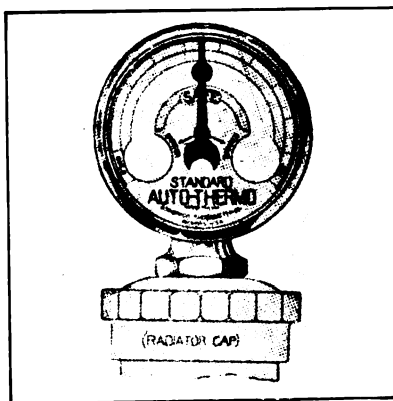
The illustration shows the valve in a closed position. When the lever is



turned to a forward position the reserve supply is obtainable

Standard Auto-Thermo.

The Standard Thermometer Company, 65 Shirley street, Boston, is marketing the Standard auto-thermo, which is a neat, compact device fitted to the radiator cap and is adapted for attach-

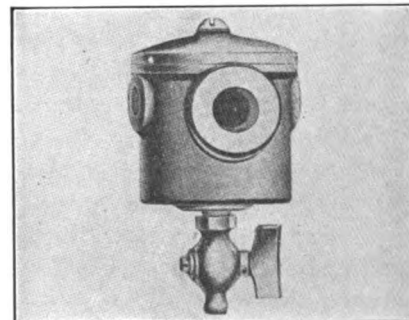


ment to either the hinged or screw cap. It is fitted by boring a hole in the cap, inserting the extension and tightening a nut on the last named member. The part extending into the radiator actuates a hand which moves over a calibrated dial, the degree and direction of movement being influenced by the temperature of the fluid of the cooler, or, in other words, the motor.

The hand moves across transparent zones, and temperatures equalling that of freezing, maximum motor efficiency and steaming are shown. When the hand is in a vertical position, it indicates "Safe"; that is, the cooling water is at a temperature when the motor is operating at its maximum efficiency insofar as temperature is concerned.

R. O. C. Superheater.

The National Economic Supply Company, 1777 Broadway, New York City, is marketing the R. O. C. Superheater, a



device designed to raise the temperature of the fuel before it reaches the carburetor, and consequently, while it is in a liquid state. It is sprayed into the mixing chamber of the carburetor in the conventional manner but, as the gasoline is heated, it is obvious that it vaporizes readily.

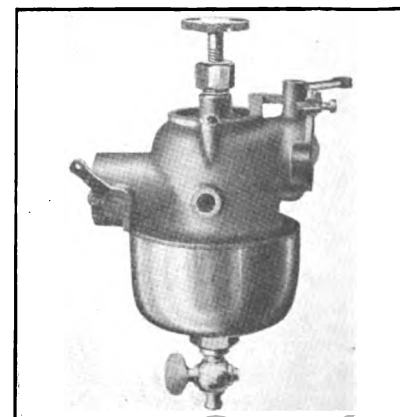
The heat of the exhaust gases is utilized to raise the temperature of the fuel, the Superheater being connected in a branch line of the exhaust. The device is installed in the fuel line, consequently all gasoline passes through it before reaching the carburetor.

Stewart Carburetor.

The Detroit Lubricator Company, Detroit, manufacturing the Stewart carburetors, has developed a design for the model T Ford motor, which is held to be very efficient, easily installed, and to make use of the heat of the exhaust manifold. It is supplied either with thumb screw adjustment or to utilize the regular Ford dash adjusting rod.

The principle of operation of the Stewart is held to be entirely different from conventional types, and the maker states that the proportions of fuel and air are accurately determined, irrespective of the throttle opening. Use is made of a metering valve, which moves up and down, according to the suction of the motor, and it is held that the amount of fuel and air admitted to the mixing chamber increases or decreases in exactly the same ratio, obtaining the correct proportions at different speeds.

The lower end of the metering valve extends down into the gasoline and around a taper. Because of the decreasing diameter of this pin the higher the metering valve is lifted the larger will be the opening into the aspirating tube, and more fuel will be drawn up.



THE A B C OF MOTOR TRUCK IGNITION.

Part XX—Construction and Operation of Simms Independent and Dual Types of Magnetos Employing Pole Shoes with Extensions Which Are Held to Make for Maximum Efficiency--Features of Dual Switch.

By C. P. Shattuck.

ONE of the oldest manufacturers of magnetos for internal combustion engines is the Simms Magneto Company, East Orange, N. J., and the product

of the engine can be rotated manually only at a slow rate of speed.

Timing Range.

It is claimed that in the Simms instruments a spark of greater intensity is produced at a fully retarded position of the breaker mechanism than at fully advanced, because of the peculiarly constructed pole pieces. It is also stated that they prevent the possibility of injury from a back fire and that it is possible to start the motor on a quarter-turn, provided, however, the mixture is correct. As the spark is advanced with the corresponding increase in speed of the motor, it is stated that its intensity is maintained over the entire firing range up to the fully advanced position, when the spark is even hotter. The standard timing lever of the Simms instruments permits of variations in the timing of the ignition over a range of 30 degrees, which is sufficient to meet the requirements of motors of five-inch bore and less.

Contact Breaker Cam Ring.

Another feature of the Simms instruments is the cam ring, which is constructed of a high grade material, hardened and ground to seven ten-thousandths (.007) of an inch. While it would appear that such close limits are not essential, it should be borne in mind that the synchronization of the spark with multi-cylinder motors is dependent, with magneto ignition, upon the break of the primary current, which is made by the contact points. The last named are primarily actuated by the cam ring, which depresses the lever

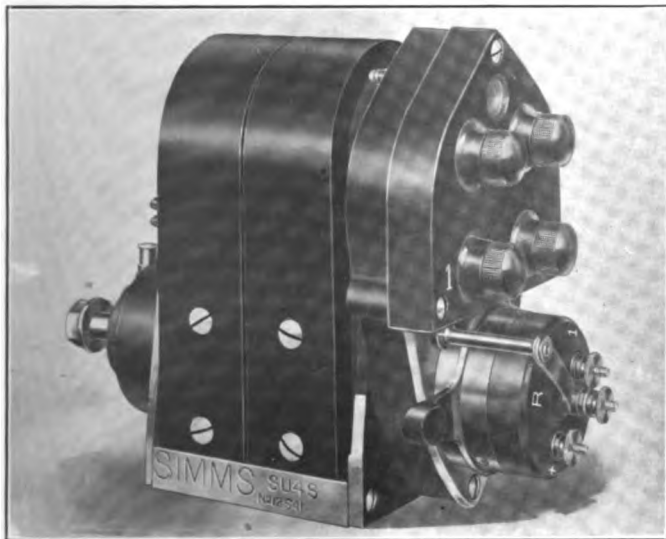


Fig. 121—Simms SU48 Magneto, a True High-Tension Instrument Utilizing a Commutator Instead of the Usual Double Circuit Breaker Mechanism.

of this concern is standard equipment on both commercial and pleasure vehicles. While in the main the principles involved in the Simms instruments are similar to those types previously presented, there are several features which differ from conventional practise. The company attributes the efficiency and durability of its magnetos to these features and to the use of the highest grade of material by skilled workmen.

How Design Differs.

The features referred to consist of the Simms patented pole shoe and the specially constructed contact breaker ring. The former is shown at Fig. 124, and it will be noted that each pole shoe has a decided extension and that these projections are diametrically opposed. The quality of the construction emphasized by the maker is that the armature cuts the maximum lines of force at both fully retarded and advanced positions. It has been explained that the output of a magneto depends wholly on the number of lines of magnetic force which are cut by the armature in its rotation, and that it is desired to cut these lines at a point where the hottest spark may be obtained.

Generally, it is customary in starting the motor on the magneto to advance the spark lever so that the greatest number of lines of force will be cut, or, in other words, the contact breaker housing is rotated to bring about an earlier break, because the crankshaft

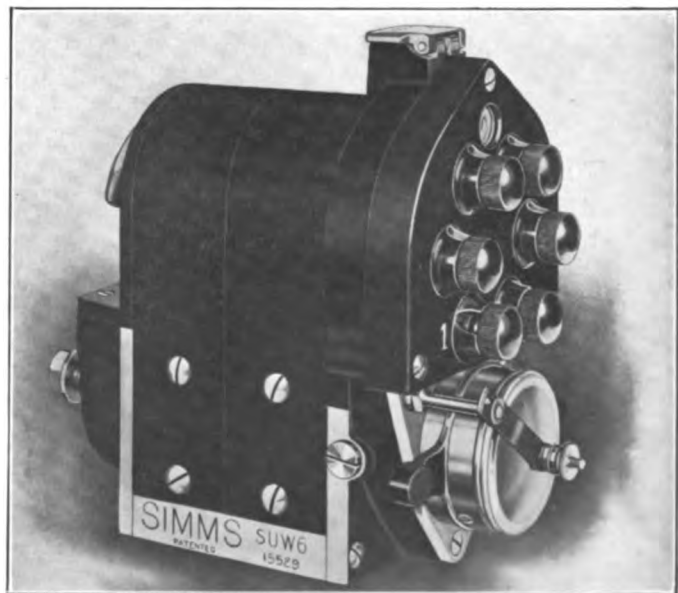


Fig. 122—Simms SUW6 Magneto, Having Water Proof Features and Being Compactly Designed.

carrying the movable platinum point, the operation of which has been fully explained. The Simms cam ring is shown at Fig. 125, which illustration also depicts the end cap and distributor housing or plate displaced.

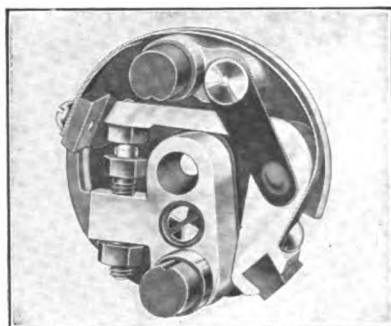


Fig. 123—Simms Dual Contact Breaker and Brushes.

All Simms instruments are of the true high-tension type, having a double wound armature, the high-tension current resulting from the secondary winding and eliminating the need of a step-up or transformer coil. They are constructed to meet the requirements of different types of internal combustion engines, and letters and numbers are utilized to distinguish the different models, also in single (independent) and dual forms. The SU4 is of the independent design; is employed with four-cylinder motors, and the motor is started and operated on the instrument. The SU6 differs only in that it is constructed for six-cylinder engines. Both of these types are manufactured in the dual form, the four-cylinder instruments being designated by SU4S, and the six-cylinder magnetos by SU6S. Water proof magnetos are produced both in single and dual forms, for four and six-cylinder engines, and are identified by the markings; for example: The four-cylinder independent is marked SUW4 and the dual SUW4S; the six-cylinder independent SUW6 and the dual, SUW6S. The SU4S is shown at Fig. 121 and the SUW6 at Fig. 122. No sectional view of the instruments is shown, as the general construction is similar to those high-tension magnetos previously described.

Materials Employed.

The base and end plates are of heavy bronze, and all matched surfaces are machine finished. No white castings are utilized at any point where strength and

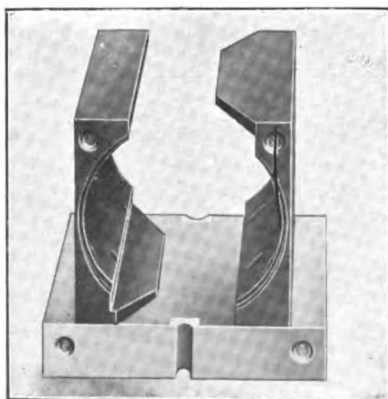


Fig. 124—Simms Pole Shoe, Having an Extension.

durability are essential. The armature is mounted on imported annular ball bearings, and the distributor bearing is a ground shaft running in a reamed bronze bearing, which is grooved for oil, lubrication being provided by a felt wick feed from an oil reservoir. The distributor board is

fitted with screw terminals, suitable for the Simms cable end, or the leads may be attached direct to the terminals, thumb screws being utilized to retain them.

The usual indicating window or "sight hole" is provided in the distributor board or housing, making timing of the instrument a simple matter. The distributor is dust and water proof; is retained by three screws, and the carbon brush, shown at Fig. 125, is of ample size. The brass distributor segments have a large surface, insuring maximum durability.

The timing lever has an arm on either side to facilitate its connection with the spark control mechanism. The lever is eliminated in the fixed spark instruments. The SU4 independent can be fitted with a stationary cam ring for fixed ignition. The platinum contact points are of the best of material, extra large in diameter, and are easily accessible for inspection and adjustment. The end cover or dust cap is retained by a spring lever and is quickly removed when desired. All important dimensions, such as diameter and taper of shaft, height of shaft from base and drilling of bolt holes in base for retaining the instrument, are in accordance with S. A. E. standard. The safety

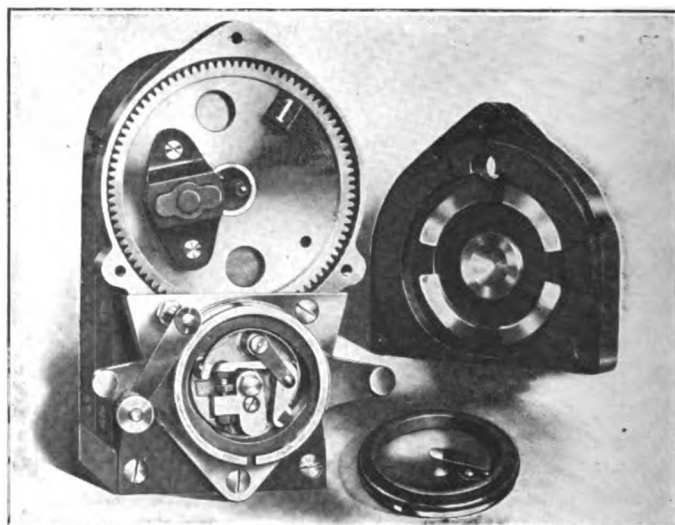


Fig. 125—End Cover and Distributor Plate Removed from Simms Magneto to Show Circuit Breaker Mechanism and Distributor Brush, Segments, Etc.

spark gap is visible through a small window under the oil flap on the rear or driving end.

Circuit Breaker Mechanism.

The circuit breaker mechanism of the independent type of magneto is shown at Fig. 125. It follows conventional practise and is attached to and revolves with the armature shaft. That employed with the dual instruments differs, as also does the cover or housing. The difference between these members is shown by Figs. 121 and 122, the former being the dual magneto. It will be noted by referring to Fig. 123 that the circuit breaker mechanism is provided with two brush holders and that a heavy carbon brush is fitted to each. They are easily removed and replaced, although it is stated that they will require no attention.

Operation of Commutator.

The Simms dual types of magnetos, which permit of utilizing a storage battery or a certain number of dry cells as an independent source of current supply, such

as for starting or operating the motor, differs materially from conventional design, in that the dash switch contains no induction coil or high-tension switch. A vibrating or battery spark is, however, obtained through the use of a coil, and, as is generally the case with dual systems, one set of spark plugs serves for both the battery and magneto currents.

The Simms system differs from the dual forms of magnetos previously described in that the usual extra circuit breaker mechanism is eliminated. The maker lays great emphasis upon this point, calling attention to the simplicity of wiring and the small number of leads and connections. It has but three low-tension connections to the dash switch and but one to the battery. This is made clear in the wiring diagram shown at B in Fig. 130.

Fitting the Commutator.

The commutator is depicted at Fig. 127. It comprises a disc of special heat resisting, insulating material, into which are molded four bronze segments,

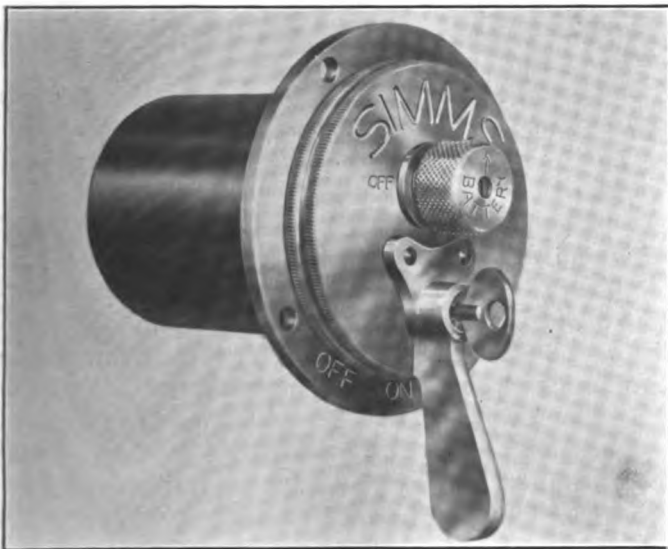


Fig. 126—Simms Two-Point Switch, Having but Two Positions—The Button Is Utilized for Starting on the Battery Sparks.

these being spaced equidistant. Two of these segments are connected with the terminals of the commutator, the other two simply serving as a path for the contact breaker brushes. The commutator is fitted to the timing lever, in place of the usual dust cover, and retained by a flat spring. It is located in its proper position by a pin projecting from the timing lever, which engages a corresponding keyway or slot in the commutator.

Simms Dual Switch.

The dual switch employed with the magneto is shown at Fig. 126. It is compact and simple and is provided with lock and key. The latter may be removed after throwing the lever to the "On" position, and there is but one other position, that of "Off". Its operation is simple. To obtain the battery and the magneto spark, the button marked "Battery" is pushed in and rotated slightly to the right. If the commutator brushes are on live (short) segments, a constant shower of sparks will be delivered to the cyl-

inder on compression, and if the latter be charged with a suitable mixture it will be exploded. This is generally termed starting on the spark from the seat.

Upon the motor starting the button is released and the magneto supplies the current for ignition. It will be seen that this obviates the moving of the switch lever from a "Battery" to a "Magneto" position, as is customary practise. It is held to be impossible to throw the switch

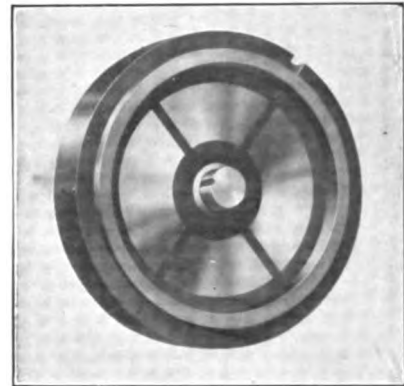


Fig. 127—Commutator of Simms Dual System.

lever to the "Off" position with the battery push button locked in position, a construction which prevents waste of the battery current should the operator be careless. One of the qualities of the Simms two-point switch is that when the lever is thrown to the "Off" position it locks automatically. From the above it will be seen that the switch is simple.

Components of Switch.

The dual coil is of the dash, cartridge, water proof type, as will be noted by reference to Fig. 126, the coil proper being located in service under the hood, the switch being placed on the driver's side. Its interior consists of a plain magnet wound with heavy wire, a condenser and an extra rapid vibrator. Instead of utilizing an induction or step-up coil for transforming the battery or low-tension current, the secondary winding on the armature shaft is employed. No sliding contacts are used and, as will be noted by referring to the wiring plan shown at B, Fig. 130, there are but three low-tension connections from the switch to the magneto and one to ground. One of the qualities of the design emphasized is that any error made in

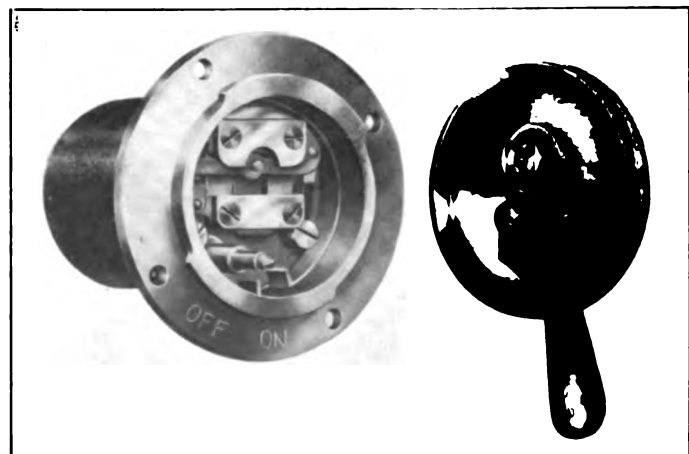


Fig. 128—Cover of Simms Switch Displaced to Show Simplicity of the Design.

connecting the magneto to the switch will not injure the system and no harm, other than exhausting the battery, can occur if the switch is accidentally left

on the "On" position with the motor stopped.

Another quality of the system is that should the coil be damaged as in an accident, the motor can be

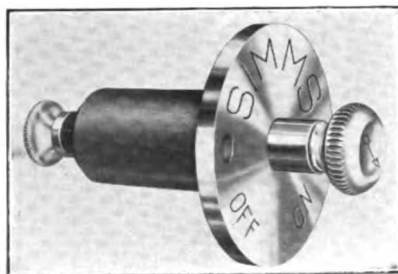


Fig. 129—Independent Magneto Switch.

operated on the magneto alone, as it is a true high-tension instrument. It is also pointed out that the dual coil will provide a vibrating spark for every position of the crank shaft from which the motor can start on the spark, and that the possibility of a back fire when starting with the lever retarded is limited to about 10 degrees on the compression stroke at dead centre.

The current consumption is said to be very low, approximately 1.75 amperes for starting and .75 when operating. It is also stated that the switch cannot be burned out with any six-volt battery, which is used. The maker emphasizes the claim that the vibrator will not require adjustment or attention only after long periods of service, owing to the large contact points utilized. Should adjustment be necessary it does not involve dismantling the construction, as a screw for this purpose is provided in the centre of the push button, as will be noted by reference to Figs. 127 and 128, being exterior and interior views respectively. The contact points are brought closer together by turning the screw, only a slight movement being necessary.

Adjusting Vibrator.

Should it be desired to displace the cover, it is accomplished by inserting a pin accompanying each system, and rotating the cover plate a quarter-turn. By slipping the spring locking ring out of position, the entire switch mechanism may be removed and without the use of tools. All switch bodies and parts are interchangeable, assuring easy replacement in the event of accident or repair.

The Simms Magneto Company states that the best results are obtained with a spark plug gap of one-fiftieth inch, and that platinum contact points should

be set to the gauge accompanying each magneto, rather than by attempting to utilize other measurement. One or two drops of fine oil in the two holes, which are plainly marked, about every 1000 miles of service is sufficient to lubricate all parts.

The armatures of the Simms magnetos are carefully wound and the wires are protected by an insulation of high dielectric strength, which is impervious to moisture. The entire winding is impregnated with an insulating compound, baked on, so that no section of the armature can absorb moisture.

The independent types of instruments are intended for motors up and including five-inch bore, and no batteries are employed for starting or operating. With motors difficult to crank the magneto may be employed with an independent battery, timer and coil system when the power plant is not equipped with a motor starter. The product of the Simms Magneto Company is guaranteed.

(To Be Continued.)

COOK GENERAL SALES MANAGER.

Otis R. Cook, who is one of the best known men in the selling organizations of motor vehicle tire manufacturing concerns, and who had for four years been connected with the Kelly-Springfield Tire Company of New York City, has been made general manager of the company and is located at the headquarters at Cleveland, O. Mr. Cook has been for 18 years connected with the industry and his knowledge of the industry and trade has been the result of long experience in differing capacities. He was in the service of the B. F. Goodrich Company, Akron, O., for 10 years, and resigned that connection in 1906 to become personal representative of H. S. Firestone, president of the Firestone Tire & Rubber Company, Akron, O. In 1908 he resigned to go to the Federal Rubber Manufacturing Company, Milwaukee, Wis., as general manager, and in 1910 went to the Kelly-Springfield Tire Company as manager of the Cleveland branch and personal representative of Van H. Cantwell, president of the company. His success in that capacity resulted in his latest appointment as general manager.

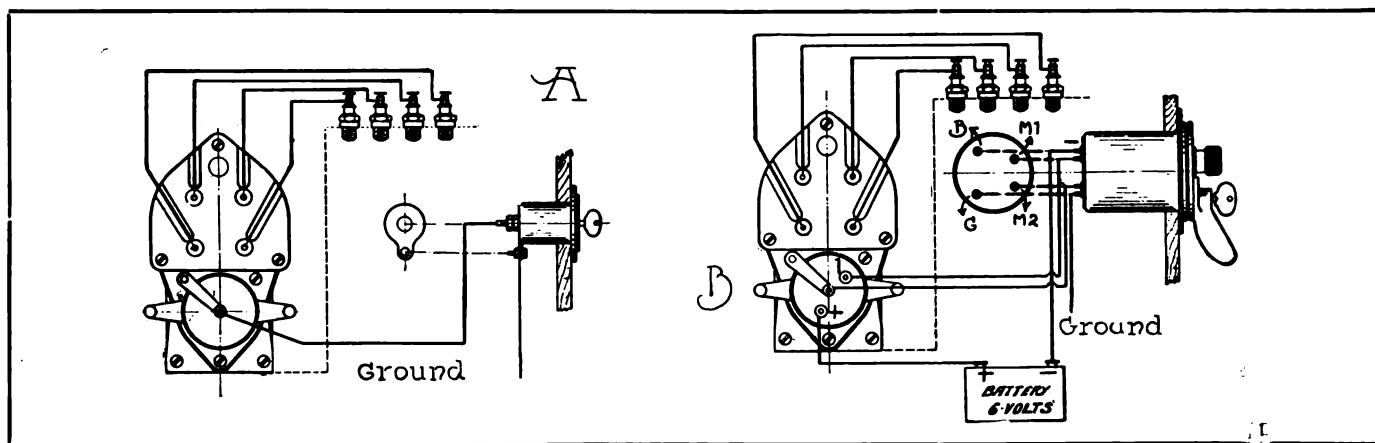


Fig. 130—Wiring Diagrams of Simms Magnetos: A, Plan for Four-Cylinder Independent Type; B, That Employed with Four-Cylinder Dual System—Note the Simplicity and Few Leads Utilized.

HINTS FOR PROPER MAINTENANCE.

CONSIDERABLE ingenuity is displayed by repairmen in overcoming various machining difficulties, and an instance of a useful lathe attachment

readily made to follow the required circular path, as shown.

GROOVING OIL DUCTS ON LATHE.

Cutting in oil grooves in bearings with a chisel is not a satisfactory method and considerable time is lost in the operation. The proper method is to utilize an oil grooving machine, but these are not common in repair shops. In an accompanying illustration is presented an attachment for an ordinary lathe which the repairman who constructed the device states can be utilized to groove any size bush or bearing. The drawing is practically self-explanatory, but the chief points to be considered are that the arrangement should be bolted firmly to the lathe body and that the adjustable arm connecting the carriage with the horizontal disc should be parallel with the lathe bed at each end of its stroke.

The screw in the carriage holder must be withdrawn before commencing operations, so as to enable the carriage to slide easily in either direction. The drive must be so proportioned as to enable the chuck to make one revolution while the tool is travelling the whole length of its stroke. An oil groove will thus be made to feed oil equally all over the bearing. For example: Assume a bush 1.5 inches long is to be grooved. The pin on the horizontal disc is set .625 inch out of centre; the connecting rod adjusted and the main carriage bed locked. The transverse screw is then removed from the tool carriage and the grooving tool set about .125 inch inside the bush, and the lathe started.

The carriage being free to slide, the connecting rod will cause the tool to travel just 1.25 inches, and

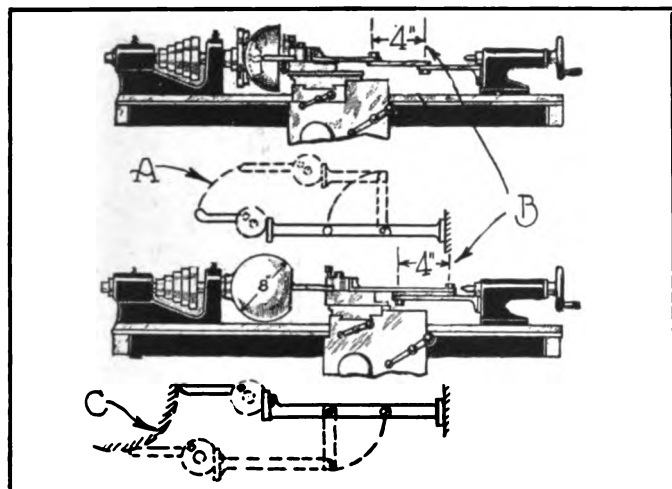
is described in a current issue of the Commercial Motor, an English publication. The repairman had occasion to replace parts of a badly damaged torque tube and ball universal joint, and, when he came to turn the ball and its seating, was confronted by a problem, inasmuch as the only machine available was a 12-inch centre lathe.

An accompanying sketch shows the attachment constructed and applied, and demonstrates how the concave and convex surfaces required were turned. The upper drawing shows the attachment for turning the concave surface; the lower depicts the ball being machined. The diagram underneath each lathe illustrates the path of the cutting tool, this being indicated at A and C.

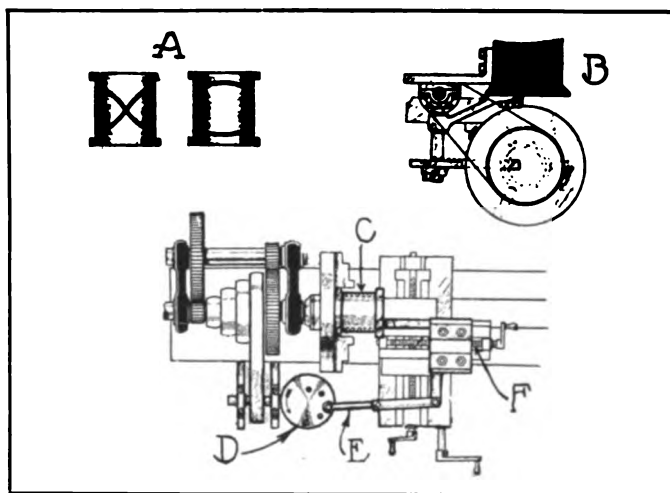
The inventor of the attachment states that it was constructed without trouble. It consisted of flat mild steel strips, the sections being .5 inch by one inch. Six lengths were cut off to obtain the necessary travel, and at the base of the angle pieces were drilled two .375-inch diameter holes. The plain ends were drilled out .5 inch.

The swivelling connecting rods, two in number, were drilled out and tapped .5-inch Whitworth at each end, the centres being carefully marked out equal to the radius of the ball and spherical seating; that is, four inches. Permitting these to swing at the end of each angle piece enabled the necessary arc of the cutting tool to be effected.

It will be noted that for either machining operation, one angle strip is bolted to the loose headstock of the lathe, and another piece to the top slide under the tool rest. Cross feed only is used, the transverse feed being free altogether so that without touching the handwheel the carriage may readily be pushed along the lathe bed. The cutting tool may then be



Device for Machining Concave and Convex Surfaces on Centre Lathe: A, Path of Cutting Tool for Ball Seating; B, Swivelling Links for Procuring Radii; C, Path of Cutting Tool for Sphere.



Attachment for Grooving Bearings on Lathe: A, Grooved Brass in Section; B, Arrangement of Drive; C, the Work Piece; D, Disc Drilled to Give Various Strokes; E, Adjustable Connecting Rod; F, Screw, Which Is Removed to Allow for Free Travel.

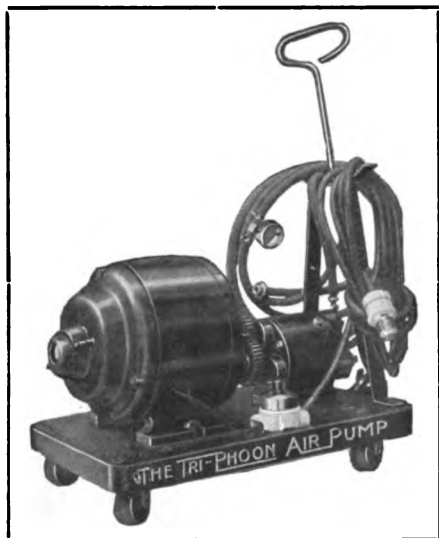
the gearing being so arranged that the chuck will make one revolution during the complete travel of the tool, a groove of the required length and pitch is cut.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE Green & Swett Company, 737 Boylston street, Boston, is manufacturing the Tri-Phoon garage pump, which is not only moderately priced, but is very small and compact, occupying but little room in the garage. One of the qualities of the pump is that it does not require the use of a pressure tank, as tires can be inflated directly and very quickly. The cost of operating is slight.

The pump is made in three and six-cylinder forms and the motor employed for the smaller size is constructed for either a direct or alternating current. The six-cylinder unit is also marketed for either direct or alternating current.

One of the features of the Tri-Phoon is that it may be driven at a high rate of speed without injury to the working parts. As shown by the accompanying illustration, it includes a .25 horsepower electric motor, suitable length of flexible cord with plug, hose, pressure



Tri-Phoon Electrically Driven Garage Pump.

gauge and switch. The equipment is mounted on a substantial platform truck, which has a convenient handle for moving it about the garage. The Tri-Phoon garage pumps are adapted for both private and public garages, and the guarantee is very liberal, the maker offering to replace free of charge any pump found to be defective or faulty in construction within a year. Descriptive matter will be supplied upon request.

HOYT FORD MAGNETOMETER.

The Hoyt Electrical Instrument Works, Penacook, N. H., maker of fine electrical indicating devices, has brought out a new magnetometer for the model T Ford which presents many practical features and is moderately priced. The Hoyt differs from other instruments utilized to ascertain the condition of the Ford flywheel magneto in that it is connected permanently in the circuit, being mounted on the dash. It is a sturdy little instrument, and is but two inches in diameter.

As will be noted by the accompanying illustration, the dial is calibrated, the letters indicating Poor, Medium, Good and Excellent. With the magneto operating, the indicating hand moves over the dial, indi-

cating the condition of the generator at various speeds. The efficiency of the magneto is determined easily. After installing the magnetometer, readings at various speeds are taken, and by comparing these with those taken later, it is a simple matter to learn if the efficiency of the magneto is not up to standard.

The Hoyt instrument is easily attached by drilling two .1875-inch holes in the dash and securing the studs by lock washers and nuts.

The wiring is simple and the entire construction can be installed in a few minutes. The Hoyt is constructed with the same care and high grade material for which the product of this concern is noted. Each instrument is carefully tested.



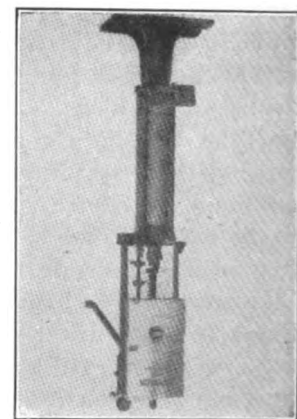
Hoyt Ford Magnetometer.

PUMPLOK.

The Charles H. Simerson Company, 4135 Hudson boulevard, West Hoboken, N. J., has been organized to manufacture the Pumplok, which is held to solve waste in handling fuel and to possess other practical features. One of the qualities of the device is that it is stated it may be attached to a standard pump in 10 minutes by engaging the main shaft by means of a slotted shaft, the construction being retained in place by an adjustable clamp that is locked and sealed, as shown in an accompanying illustration. It not only prevents unauthorized drawing of gasoline, but checks the amount drawn by each person having access to the pump.

The drawing of fuel is made possible by the use of key checks, each person being supplied with a given number bearing his number or individual design. Consequently, each must account for as much gasoline as represented by the checks found in the Pumplok's receptacle. A simple tally sheet is utilized and the operator sets down the quantity drawn, and the price for cash or charge sales.

A separate counter is incorporated, showing tenths of a gallon, which may be adapted to single or double acting pumps and to indicate the actual amount of gasoline drawn, whether in even gallons or fractions. A separate key check is required for each gallon or fraction thereof, and the pump is locked at the comple-

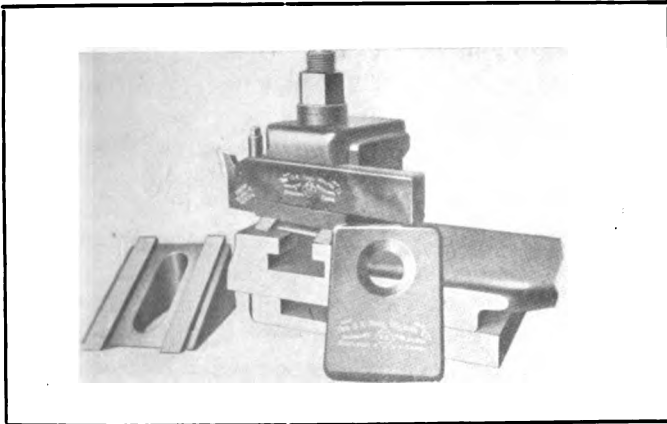


Simerson Pumplok.

tion of each drawing, so that the next operator cannot take advantage of the fact that only a fractional quantity was drawn by the previous workman. The amount drawn is set down on the tally sheet as shown by the counter.

O. K. TOOL POST.

The O. K. Toolholder Company, Shelton, Conn., of which C. Hilterbrant, 99 Nassau street, New York



O. K. Tool Post for Holding Tool on the Side and for Adjusting It Vertically.

City, is direct representative, is manufacturing the O. K. tool post holder, shown in an accompanying illustration. It holds the tool on the side, thus enabling one to get up near the chuck or face plate. With this tool post the tool is adjusted vertically, thus maintaining the clearance on the cutting tool. The tool post swings around at any angle.

It is stated by the company that after placing it in the desired position, the process of tightening has no tendency to twist the tool post, and that the bolt is made to fit the T slot so that there is no danger of injuring the same. The nut is made to fit the tail stock wrench.

When it is necessary to grind the tool and it is desired to remove the tool or holder, the vertical adjustment is not affected. By swinging the tool post around at right angles and using a small V block, it is held that the design makes the strongest kind of a boring tool holder. All parts are steel drop forgings, carefully machined, case hardened and interchangeable. The O. K. comes in three sizes, the No. 1 post being suitable for 14 to 18-inch lathes, the No. 2 for 20 to 28, and the No. 3 for 30 to 40. The tool post No. 1 is adapted for holders from one inch to 1.5 high and any width, the No. 2 from 1.25 to 1.75 high, and the No. 3 from two to 2.5 inches high and any width.

The O. K. Tool Holder Company also manufactures the O. K. system of tool holders, and tools for lathes, planers, shapers, boring mills, etc.

K & B ADJUSTABLE WRENCH.

The Kilborn & Bishop Company, New Haven, Conn., is manufacturing the K & B adjustable wrench,

which opens on an angle of 22.5 degrees with the handle, permitting of its use in places difficult of access with ordinary tools. All parts are interchangeable and carefully fitted. The movable jaw and handle are each a solid piece steel drop forging. The shape of the handle is such that the hand readily becomes conformed to it.

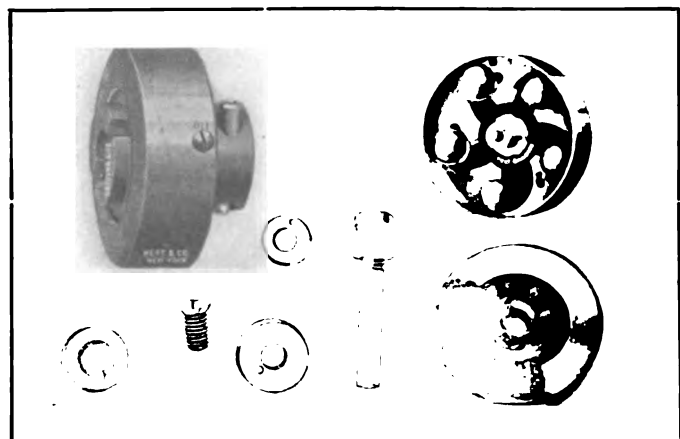
HERZ AUTOMATIC TIMER.

Herz & Co., electrical engineer, is marketing the Herz patented automatic time adjustment for ignition apparatus. It is designed not only to prevent accident through back firing, caused by improper advance of the spark, but it is held to make for economy in the operation of pleasure and commercial vehicles. The time of ignition is adjusted automatically in accordance with the number of revolutions, and the range is up to 40 degrees.

The components of the device are shown in an accompanying illustration and it will be noted that it comprises a coupling consisting of two juxtaposed discs, the construction being interposed between the magneto and driving shaft. Each disc is provided with five grooved curves running in an opposite direction to those in the other disc. Five steel balls are held in these grooves and function in a similar manner to the weights of a governor, being forced outward by centrifugal force in direct proportion to the speed of the motor. The maker states that this construction imparts a twist to the armature of the magneto in relation to the driving shaft.

It is held that any desired degree of adjustment may be obtained by altering the curves in a suitable manner, and that the absence of springs, journals, joints, etc., and the certainty with which the balls are guided, make for reliability of operation.

The device is supplied either as an integral part of the ignition apparatus or in the form of a coupling. Owing to the small space it occupies it is stated that in many instances it can be used in place of the ordinary coupling and without alteration. All parts are made to gauge, are interchangeable, and constructed of the best of material. Special literature is issued by the company and will be sent free on request.



Herz Automatic Time Adjustment for Ignition Apparatus Up to 40 Degrees.

CORRESPONDENCE WITH THE READER.

Lubricating the Motor.

Will you explain in a non-technical manner the various oiling systems utilized with gasoline motors? After visiting the Boston show and in reading over the catalogues I collected, I found the terms used about the oiling systems confusing.

W. J. D.

Boston, March 22.

Lubricating systems may be divided into two general classes, splash and pressure, and these combined.

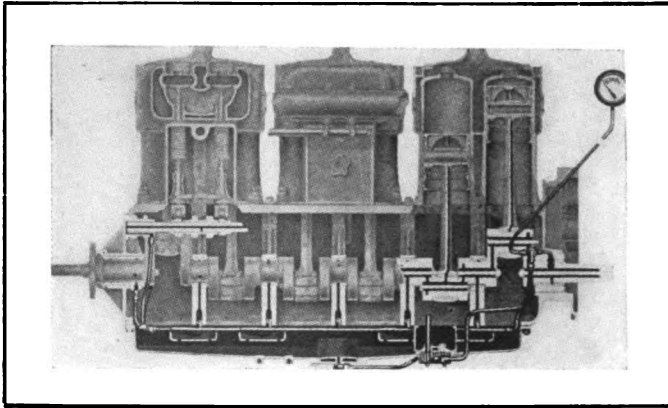


Fig. 1—Showing Leads Utilized in Pressure or Constant Circulating Type of Lubricating System.

The principle of the splash system is one in which the ends of the connecting rods dip into an oil reservoir in the lower half of the crankcase, splashing the lubricant to the working parts of the motor. The system may include means for feeding the lubricant to the crankcase, such as a pump, or by utilizing the pressure of the exhaust to force the oil to the reservoir, etc. Provision may also be made to maintain a certain level of oil in the crankcase, and when such is the case the system is termed the constant level splash.

The pressure or constant circulating principle involves the delivery of the lubricant from the reservoir through piping to the main bearings, connecting rods, etc., from which the excess oil gravitates back to the reservoir, where it is again taken up by the pump and again circulated. The splash-pressure system is a combination of the two above described. There also is the non-circulating system in which the oil is used but once.

An example of the pressure or constant type is shown at Fig. 1, the illustration depicting a system utilized in the motor of a pleasure vehicle, to bring out the points described. It will be noted that the crankshaft and camshaft are drilled from end to end, and that there is an independent feed of oil direct from the pump to the seven main bearings of the crankshaft and to the ends of the camshaft. There are outlets for each of the five bearings of the camshaft, similar to those through which the oil reaches the crankpins from the hollow shaft. From the chief distributing points at the main bearings the lubricant is conducted through the hollow crankshaft to the crankpins and from them to the wristpins, so that the oil is delivered under direct pressure to the parts. A gauge on the dash indicates the pressure under which the system is operating. The path of the lubricant is

easily followed in the illustration by the black lines.

A combined system, which is catalogued by the maker of the car as automatic, is shown at Fig. 2, it being employed with a well known machine. It provides the splash feature, as the lubricant is delivered to a trough under each connecting rod, the oil being forced to the vessel by a pump. These troughs tilt, being connected to the throttle in such manner that at high motor speeds the ends of the connecting rods dip deeper. The oil levels at varying speeds are indicated by dotted lines. The linkage and oil reservoir are also shown.

Governors.

Are governors practical for a truck? Will they prevent overspeeding? How is it accomplished? PRACTICAL.
Waterbury, Conn., March 19.

The use of governors on motor vehicles is not new, as they were formerly fitted to pleasure cars. When employed with a commercial vehicle their function is to prevent the car exceeding a predetermined speed, and generally the device is fitted to the carburetor. When so used it controls the amount of mixture passing to the cylinders, a form of valve being employed which automatically opens and closes, its action being regulated by the speed of the motor.

Centrifugal governors are also utilized, these generally being operated by balls or weights linked to one of the revolving spindles of the motor, and also linked to a collar or sleeve sliding on the same spindle. The weights are normally held close to the spindle by springs, but as the speed of rotation increases the weights fly outward, more or less, and in so doing move the collar lengthwise. The collar is generally connected to the throttle, so that when a certain speed is attained the governor begins to cut down the supply of mixture. This slows the motor, the weights return inward, the collar moves back and the throttle is again opened so that the motor picks up its speed once more.

Some governors are adapted to act on the valve mechanism so as to modify the operation of the

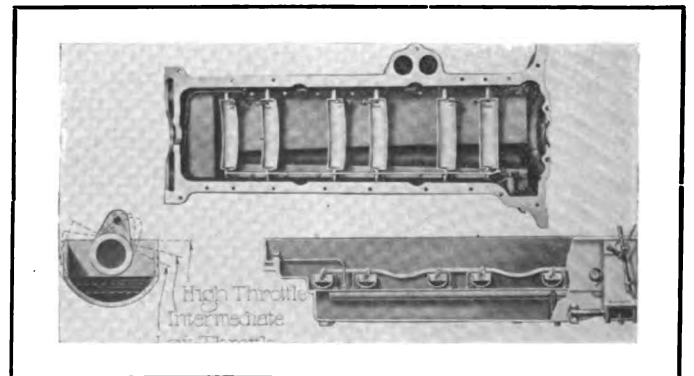


Fig. 2—Combined Splash and Pressure Feed Lubricating System—It Is Also Termed Automatic Because of the Use of Tilting Troughs.

valves, varying the lift of the inlet or exhaust members. A description of a governor for commercial vehicles will be found elsewhere in this issue.

GOODYEAR SELLING POLICY.

The statement is made that the Goodyear Tire & Rubber Company has established a policy that will be applied eventually throughout the country as rapidly as this can be accomplished, this being to manufacture and supply tires from branches or service stations direct to the retailers, this meaning the eventual elimination of all retail selling. The reasons for this are that in the maintenance of its own retail departments the company is actively competing with the retailers, who believe they are entitled to all the business they can develop, and the company has been very considerate in its relations with retailers, crediting them with business that might possibly be regarded as its own. The maintenance of the retail stores has been expensive as well, and the wholesale distribution can be made for comparatively reduced cost. For these reasons the sales departments will be combined with the service stations in the larger cities and the retail trade will be handled by the dealers and agents, who will be given all necessary assistance and support from the factory sales organization. The withdrawal of the retail competition will also be an incentive for the retail dealers to carry larger stocks, to meet every probable demand upon them.

A KisselKar truck in the service of the Marshalltown Bottling Works, Marshalltown, Ia., which has been used since July, 1912, is credited by General Manager F. G. Bailey as having saved half its cost, for it has replaced seven horses and the work is done better than it could be with animals. The machine is used in very hard cross country haulage.

The Gramm-Bernstein Company, Lima, O., builder of B. A. Gramm's trucks, paid a semi-annual dividend of 3.5 per cent. on its preferred stock April 1. The company's report shows a gratifying increase in number of trucks sold and the indications are there will be a substantial growth of business during the coming year.

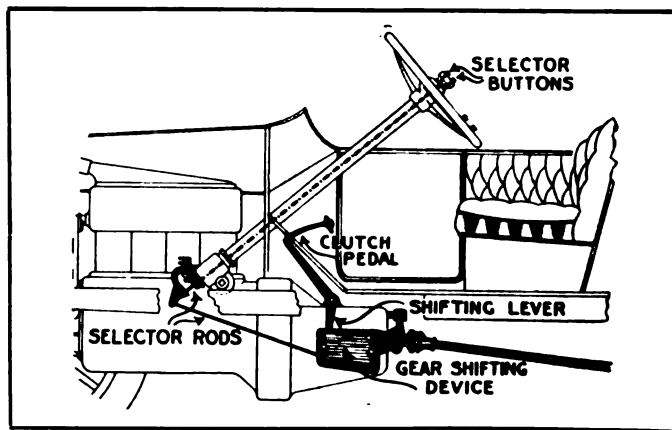
Howard Limrick, who was manager of the Boston branch of the B. F. Goodrich Company for 12 years, has resigned that position to become manager of the Boston branch of the Kelly-Springfield Tire Company. William Moore succeeded Mr. Limrick as manager of the Goodrich branch.

The Mercury Manufacturing Company, Chicago, Ill., makes but one type of vehicle, a 1000-pound wagon, that it has produced for four years, and is in no manner connected with the manufacture of the Mercury cyclecar.

J. E. Morgan, formerly with the Metzger Motor Car Company, has been made assistant sales manager of the Standard Motor Truck Company, Detroit, Mich.

VANDERVELD GEAR SHIFTER.**Mechanical Selection of a Gear Ratio by Button and Change by Pedal.**

The Vanderveld gear shifter, the invention of A. Vanderveld, and manufactured by the Grand Rapids Show Case Company, Grand Rapids, Mich., is a foot-operated, mechanical gear shifting device that may be applied to any form of motor vehicle, either passenger car or service wagon or truck, the selection being made by pressing a button. The shifter as used weighs about 10 pounds and it is mounted convenient to the transmission gearset to have easy means of linkage and operation. Placed on top of the steering wheel, or near to it, are the buttons, one for each speed ratio or gear. Attached to the clutch pedal is a lever or arm that has mounted on it two blocks adapted to engage the gearshift fingers, there being one for each of the gears, which is connected directly to the rods that are coupled to the push buttons.



The Vanderveld Mechanical Gear Shifting Device as Installed in a Pleasure Car Chassis.

Pressing any button raises the finger connected with it into the path of travel of the shifting blocks, and the forward movement of the clutch pedal through the block contacting with the finger pulls the gear into mesh. If at the time a gear is in mesh, as the clutch pedal is pushed forward the block first contacts with a neutralizing member which releases the gear in mesh, and when the gear is made neutral by further movement of the clutch pedal the block contacts with the finger, which selects a block and pulls it through.

The pressing of the button does not actually shift the gears, this being done by the forward movement of the pedal, so that one may at any time select the next speed one expects to use, or this predetermined choice may be changed by pressing the first selected button and the next complete forward movement of the clutch pedal actually affords the speed ratio selected. A material gain in gear changing is made by this method of predetermination. No springs are used in the shifting of gears, the entire operation being a positive mechanical action, conventional clutch pedal. Being positive in action and allowing the "feeling in" of the

gear, the driver's hands are free for steering, the device facilitates operation in traffic and on rough roads, and eliminates the shifting lever and insures greater accessibility to and from the machines. When applied to trucks, gearset wear is minimized and danger of stripping gears is eliminated. The illustration shows the device installed in a passenger machine.

SOUTHER ELECTED VICE PRESIDENT.

Henry Souther, one of the best known consulting engineers of the motor vehicle industry, who for four years had been associated with the Standard Roller Bearing Company, Philadelphia, Penn., in that capacity, has assumed the duties of vice president of the Ferro Machine & Foundry Company, Cleveland, O., to which position he was recently elected. Mr. Souther is recognized as an authority on metallurgy. He is a graduate of the Massachusetts Institute of Technology, and his early work was with the Pennsylvania



Henry Souther, Vice President, Ferro Machine & Foundry Company.

Steel Company, leaving that concern in 1893 to become an engineer for the Pope Manufacturing Company at Hartford, Conn. He resigned this position in 1899 and established a laboratory at Hartford, and his services were much in demand by motor vehicle manufacturers. He was consulting engineer for the Association of Licensed Automobile Manufacturers and has been prominent as a member of the Society of Automobile Engineers, serving that organization as president in 1911.

The Mason-Seaman Transportation Company, with capital of \$10,000,000, has been incorporated in New York City by Will B. Harding, James M. Shaw and P. Francis Alther, to engage in a general cab, livery and automobile business.

The plant of the Sandusky Auto Parts & Motor Truck Company, Sandusky, O., is to be used for building tractor engines by a company of which George W. Schwer, vice president of the Ohio Motor Company, is organizer.

The Aluminum Castings Company, Cleveland, O., has located the offices of its general manager and purchasing agent at Detroit, Mich.

LOCAL TAXATION POSSIBLE.

If the bills now pending before the New York legislature become law, the provisions of the Callan law, which now is in force, which provide for state taxation through the payment of registration fees, will be repealed, and instead a flat rate of \$2 for registration will be established, and the vehicles will be taxed at the local rates in the communities in which they are owned. This is based on the demand among the legislators for the distribution of the tax upon the machines in the villages, towns or cities in which they are owned, that these communities may distinctly benefit, instead of the state. The bill that repeals the Callan law provides that no person shall drive a motor vehicle who is intoxicated, and for the violation of the statute there are penalties that may be fines up to \$500 or imprisonment for a year, or both, at the discretion of the court. The other bill is a general amendment of the law relating to the use of the highways by all vehicles.

TO SELL ATLANTIC VEHICLE COMPANY.

George W. C. McCarter, trustee in bankruptcy for the Atlantic Vehicle Company, has invited bids for the sale of the plant and equipment of the company at 357 Oraton street, Newark, N. J., consisting of the office furniture and fixtures, material, uncompleted and completed motor trucks, the drawings, blue prints and the good will of the business. Sealed bids will be received by the trustee at his office at the Prudential building, Newark, to April 14, and the bids will be opened the following day at the office of Edwin G. Adams, referee in bankruptcy, Essex building, Newark. If the bids are not accepted the property may be disposed of at public auction.

The Hackney Manufacturing Company, St. Paul, Minn., has been acquired by the Standard Motor Company, Mason City, Ia., and the members of the Hackney company have been added to the board of directors of the Standard Motor Company. The manufacture of Hackney automobile plow tractors will be continued at St. Paul.

The American Electric Car Company has been incorporated at Portland, Me., with capital of \$1,500,000, to manufacture and deal in automobiles and parts, etc., by F. A. Brand of Cleveland, O., and T. Huss of Saginaw, Mich. This is the company formed by the merging of the Argo, Borland-Grannis and Broc companies.

Plans are now being prepared by Safety Director Holmes of Cincinnati, O., for the complete motorization of the fire department of that city, and an appropriation of approximately \$250,000 will be asked to accomplish this result.

FEATURES OF 1914 POWER WAGON DESIGN.

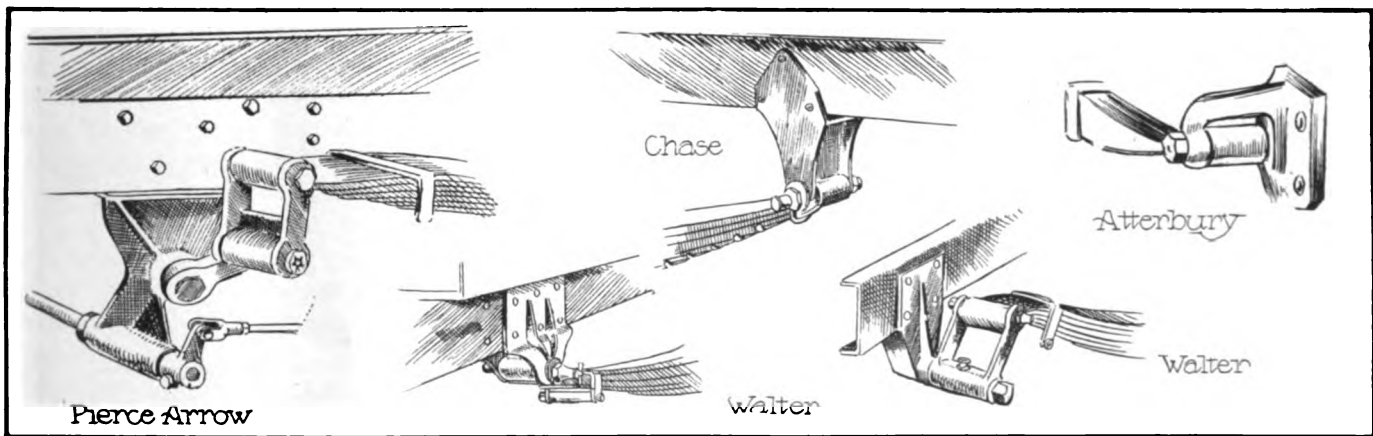
Characteristics of Machines That, Seemingly Incidental, Are of Material Importance in Increasing Efficiency and Reducing Expense of Operation.

THE statement that motor vehicle practise has converted engineering theory to a material extent may be surprising to those who regard science as applied to construction as infallible, but in the evolution of power driven vehicles, from the carriage designed for animals, converted by the installation of an engine, to the seemingly perfected automobile of latest type, many principles were established that were at variance with those accepted by engineers as being sufficient. Few of the concerns organized at the inception of the industry were founded to build service wagons and trucks. Automobiles were regarded as suited for pleasure purposes only and not practical for freight transportation. For the reason that there was really no demand for either wagons or trucks, those who engaged in constructing them found no encouragement, and production, generally experimental, was

vehicles learned from experience that the constructional requirements were entirely different with the two types of machines. Principles that could be applied to other constructions failed because of the stresses that had not been anticipated, and material that for many purposes was in every way sufficient was found inadequate from the deterioration from vibration.

Fatigue Caused by Vibration.

Crystallization of metal, which is otherwise known as fatigue, is the greatest enemy of motor vehicle engineers. This condition is certain to result, no matter how carefully a design is created, and the hope of practically every designer is to defer it by providing differing forms of protection. There is no question that the high grade metals will endure longer than the cheaper, and yet there is no definite gradation of



Some Examples of Spring Design: The Linkage of the Shackles of the Pierce-Arrow Two-Ton Chassis, the Pivoted Ends of the Rear Suspension of the Chase and Atterbury Worm Driven Machine, the Rear Connection of the Walter Front Spring and the Hanger of the Rear Spring of the Same Truck.

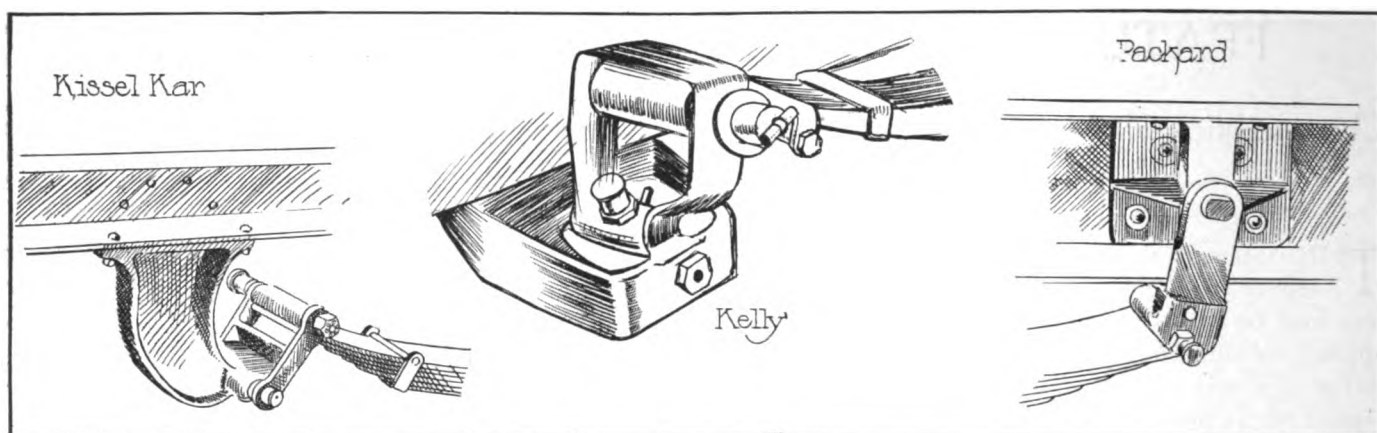
not only costly, but disappointing to those who sought to utilize these machines.

The majority of the older concerns building power wagons today originally manufactured pleasure vehicles, and with a foundation of engineering knowledge based on experience with these types of vehicles the freight machines were developed. In some instances the designs were worked out with extreme care, expense was not spared in experimental development, and no vehicle was offered for sale until it was believed to be equal to the requirements. These machines have been comparatively little changed as a rule. In other instances pleasure car design was adopted with a result that efficiency and endurance were lacking, and reputation was sacrificed.

The scientific combination of metals, for demand for material of extreme strength stimulated the production of alloys, insured construction of light weight for pleasure cars, but the engineers designing freight

the service value of metals because of the wide diversity of uses and conditions of operation, all of which have potent influence. Scientific production of material, careful determination of physical elements before use, and special treatment, will insure exact quality, and proportioning will afford a sufficient factor of safety, but obviously this is as far as engineering skill can go, for use in every case will differ, and this cannot be anticipated.

Because of the vibratory influence upon the metal of a chassis the springs that support the frame are of the greatest importance. The wheel is supported by a rubber tire that is distorted by pressure upon it and there is some degree of resiliency afforded by it, this lessening as the tire wears. The wheel and the axle and the springs are assembled solidly in contact with each other, so that the road shock, which varies with the weight, speed, character of obstruction and the condition of the tire, is communicated through the



The Cored Cast Steel Forward Hanger of the KisselKar Rear Springs; the Rectangular Bracket and Shackle of the Front End of the Kelly Five-Ton Truck Rear Suspension, and the Forward Shackle of the Rear Spring of the Four-Ton Packard Chassis.

wheel and axle, and is supposedly absorbed by the spring. The tire deadens the shock, but the vibration of the wheels, axles, springs and other connections is material.

Stress Absorption by the Springs.

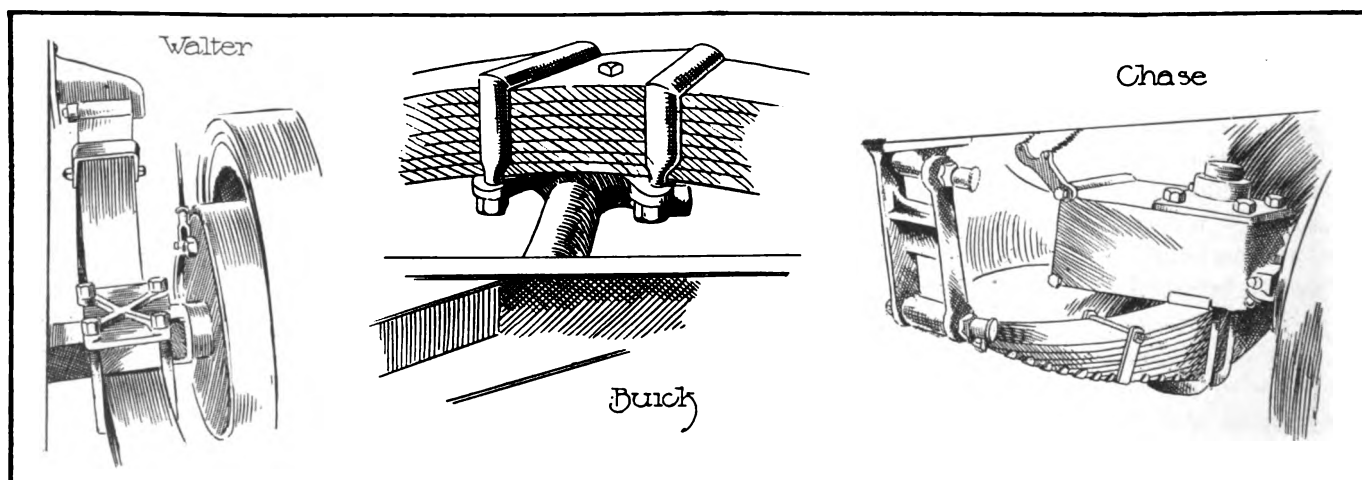
The frame and the mechanism it supports is, however, subjected to the vibratory influences of the motor, which is operated at greatly varied speeds, and these are also assumedly absorbed by the springs. Thus it will be seen that the springs perform a double function so far as protecting the construction is concerned, to say nothing of the protection of the freight. Theoretically the springs ought to be as resilient as possible. This resiliency is secured by tempering, but the other metal components are heat treated to obtain toughness. The frames of most motor vehicles are suspended on shackles that are carried on brackets or hangers at the rear end, and on front springs that are pivoted transversely at the spring horns and fitted with shackles at the rear ends. This construction permits unrestricted deflection and reflexion of the rear springs, the drive being taken by radius or torque rods or tubes, and the fullest action of the springs is obtained. The forward springs are so mounted that the vertical movement of the axle is not limited, but the wheels are drawn by the forward section of the

springs. The varying length from deflection and reflexion is provided for by the rear shackle.

The stress upon the front springs is entirely different from that endured by those at the rear. The forward wheels are free rolling and are carried by the momentum or velocity of the vehicle, and there are no traction or braking influences upon them. The springs carry but a small part of the load, and while they are expected to absorb a considerable part of the vibration of the engine, they are generally much lighter and more resilient than the rear suspension members. But these springs are usually shorter and lighter than the rear suspension, and with rare exceptions they are under the chassis frame, this manner of installation being necessary to permit the turning of the wheels.

Varying Effects Upon Springs.

The forward springs carry from 10 to 40 per cent. of the load, and the rear springs from 60 to 90 per cent., and with springs under the chassis frame there is more or less sideways that causes transverse stresses, these being in ratio to the weight and height of the centre of gravity of the freight carried. The experience with light vehicles is that the forward springs are usually sufficiently resilient in all conditions, but the rear springs are stiff and do not absorb the shocks as readily as when loaded, and with the



The Manner of Seating the Underslung Rear Spring of the Walter Five-Ton Front Wheel Driven Truck and the Large Bracket Housing the Forward Rear Spring Eye, the Arm Carrying the Full Elliptic Spring of the Buick Wagon, and the Rear Spring Seat and Double-Yoke Shackle of the Chase Three-Ton Truck.

heavier machines this effect is pronounced. Many designers have sought to minimize this result by varying the length of the springs, to obtain longer and easier movement, and by installing supplemental or auxiliary springs that will become operative after the main springs have settled to a certain point. Auxiliary springs, however, have no effect whatever unless the machines are carrying at least partial loads.

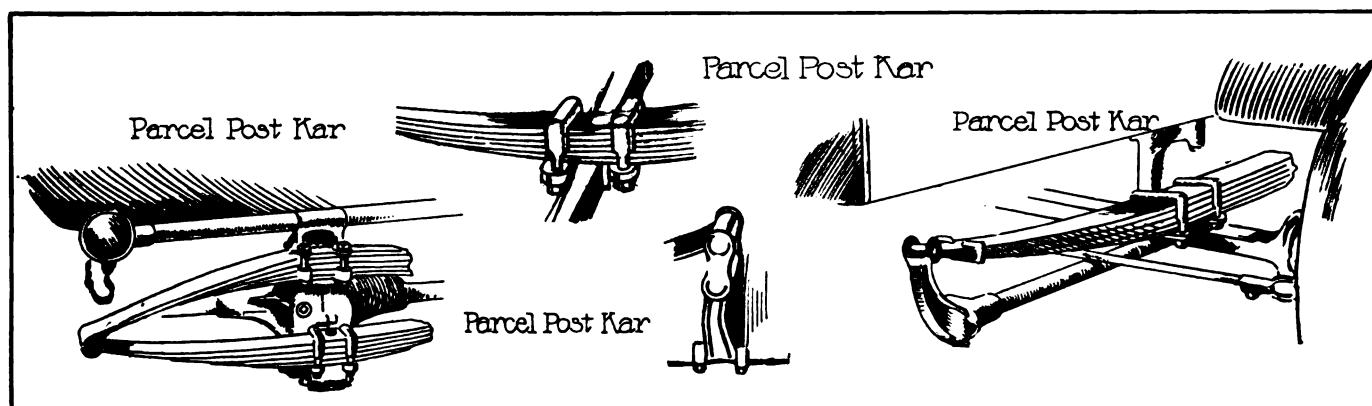
The springs are secured to seats on the axles, these being generally of somewhat larger area than the width of rectangular forms, and are usually special fittings with the housings that carry the live or floating types. Frequently saddles are used that are fitted above or under the springs, and the attachment is by clips or U shaped clamps that encircle the springs and saddles and are bolted to the axles or seats, or through yokes that extend across the ends of the clips. Being secured in this manner the resiliency of the springs is afforded by the sections extending from the seats to the shackles, and these vary from 18 inches with the light delivery wagons to 28 inches with the heaviest trucks, although with the largest sizes of underslung springs the section may be as

ally bushed with phosphor bronze, and the spring and shackle bolts are made large and are hardened, so that with the anti-friction quality of the bronze when contacting with the alloy or nickel steel bolts much longer service can be obtained. The bronze bushings or the bolts can be renewed as frequently as desired. Conventional practise is to fit the bolts with grease cups to insure constant lubrication, and this means largely increased endurance.

Adoption of Foreign Practise.

The designing of spring hangers or brackets is decidedly important in that these must be sufficiently strong to resist all strain, the stresses must be so distributed that the frame will not be twisted by side-sway, braking or traction torque, and action must at all times be free. The American practise has been to have the ends of the rear springs so coupled that there will be unrestricted movement, the driving thrust being taken by radius rods, while torque arms have been generally used to resist the braking and traction stresses.

The new Chase three-ton truck and the Atterbury 3000-pound wagon chassis have been designed in ac-



The Three-Point Suspension of the Parcel Post Kar: The Full Elliptic Spring Mounted Transversely on the Rear Axle, the Forward Spring Seat and Yoke for the Spring Clips, the Rear Shackle of the Front Spring, and the Forward Flat Spring from Which the Front End of the Frame Is Underslung.

much as 30 inches, because of the greater arc, measured from the centre of the axle seat.

Maximum Action at the Eyes.

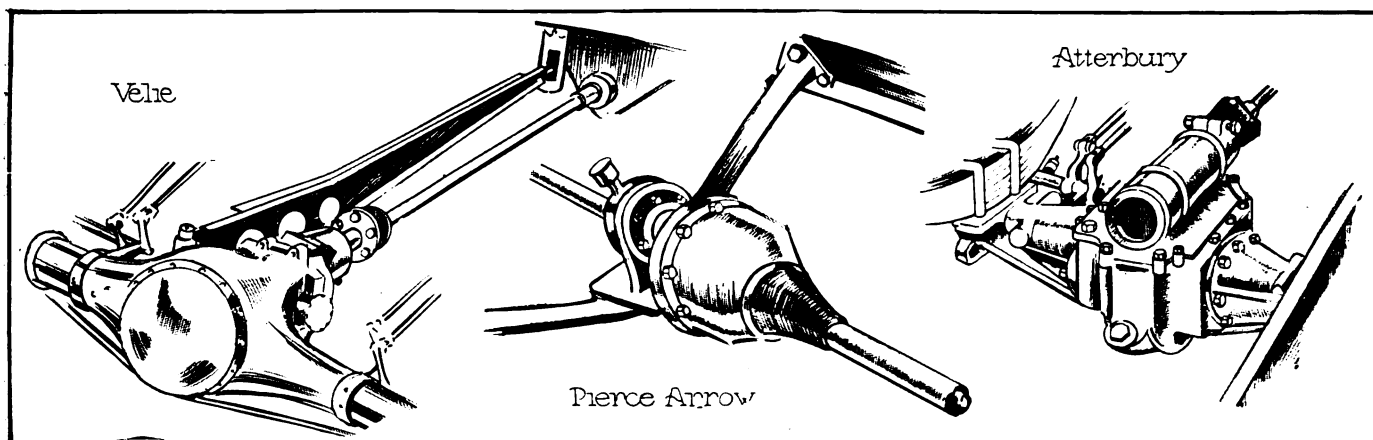
But as the springs are composed of from five to 17 leaves, the greatest number at the centre, these gradually increasing in length, the greatest deflection and reflexion is at the ends, and no matter what the form of suspension the movement is maximum at the eyes. In the front springs the forward ends are pivoted transversely, but the motion there is not as great as at the rear ends, and the wear at the spring eye, on the spring bolt and on the bolt carrying the shackle, is decidedly increased.

The movement of the rear spring is much greater and the wear at the eyes is correspondingly increased from the deflection and reflexion, the traction and braking torque, contacting with road obstructions and the effect of sidesway, so that the effect is much more rapid. The springs must necessarily be tempered and for this reason the bolts will wear quickly. To prevent wearing the spring eyes are very gener-

cordance with French practise, which is to dispense with radius rods and to use comparatively flat arc rear springs which are pivoted transversely in the forward hangers, as are the front springs in American construction, with the rear ends shackled, all stresses being taken by the forward sections. Both of these machines are worm shaft and gear driven, and provision is made with telescoping shaft connections to prevent end thrust, for the rear axles will be moved backward and forward slightly with the deflection and reflexion of the springs.

The comparatively flat arcs of the springs (the Chase spring is straighter than the Atterbury) minimizes this movement, but there is greater wear at the rear spring eyes. The stresses upon the springs require larger and heavier hangers or brackets, and the Chase hanger is webbed and fitted so that it bears the full width of the frame, and the bearing surfaces are very large.

The master and main leaves of the spring are turned to form an eye, the two being an inch thick,



The Long Skeleton Type of I Section Torque Arm of the One-Ton Véhe Chassis, the Centre Frame Member of the Pierce-Arrow Two-Ton Chassis That Supports a Self-Aligning Bearing and the Main Driving Shaft, and the Sectional Rear Axle of the Atterbury 3000-Pound Machine.

and the other leaves are thin and longer than the average, being lipped to prevent separation. The spring bolts are very large and have bearings in bronze bushings. It will be noted from the accompanying sketch of the front end of the rear suspension that the spring is nearly flat when the vehicle is light, and when loaded it is practically horizontal, so that the driving thrust is almost parallel with the line of the chassis frame. The elimination of the radius rod is a decided saving in weight, and simplifies the construction and minimizes the wearing parts.

The second sketch shows the manner of retaining the underslung spring to the square section of the cast steel axle housing, by long clips that pass through the housing and a saddle on which is seated a large rubber check. The spring seat is formed with lugs that fit at either side of the axle and prevent longitudinal movement of the spring. The rear shackle is a double yoke with comparatively long arms that carry very large bolts, this providing for considerable movement of the spring with practically no resistance.

The Atterbury design has a bracket bolted to the frame side member with a curved arm extending in which is an eye. The arm is carried by a boss in the centre of the bracket, and this boss is bored in the centre to coincide with the eye in the arms. The spring eye is fitted with a bronze bushing and the spring bolt is carried through the arm and screwed into the boss, this giving a very light, but strong construction, retaining the spring rigidly, and bringing the chassis frame very low. This bracket takes all stresses, and, as may be assumed, the spring bolt is very large. The spring has a greater arc than the Chase, but this is materially reduced, however, when a load is carried.

Drive Through Front Springs.

The Walter front-wheel driven truck has the Latil spring suspension, this having the forward ends shackled and the rear ends pivoted in hangers, so that in this design the machine is really drawn by the springs. To secure sufficient turning radius for the wheels, however, the springs are mounted under the frame, and as there is not the driving thrust to be endured the principal purpose is to obtain a construction that will not yield under the drawing or pulling

strains. This form has been used in France for nine years with very satisfying results. The springs are carried forward on conventional shackles and there is a very free movement. The centres of the forward springs are bonded by sleeves shrunk on while hot, this insuring the retention of the plates without weakening them by drilling for bolts, and making a solid assembly that can be secured to the axle with certainty that it will not be affected by the strains upon the clips. No matter what the strain the spring leaves cannot be separated. The deflection caused by the driving torque is especially noticeable in this machine.

The underslung rear springs of this chassis are mounted at both ends in shackles, the front hanger being a cored casting that is bolted to the side of the frame, into which is fitted a heavy bolt carrying the usual yoke. But the rear shackles are yokes that are mounted on the arms of brackets bolted to the chassis frame side members, the ends being carried by bolts fitted through the spring eyes. The rear springs are secured to the axles by very heavy clips that encircle the springs, the ends being passed through and attached by nuts to square saddle plates on top of the axles. The form of the plate, with the diagonal webbing, is shown in the accompanying sketch.

The Pierce-Arrow Design.

The front rear spring hanger of the Pierce-Arrow two-ton machine is a large casting that is lightened by judicious webbing, and this carries at the lower end a long bearing in which is mounted the emergency brake shaft. The shaft carries arms at either end that are connected with the yoke ends of the pull rods of the brake linkage. The shaft somewhat stiffens the frame and preserves the relation of the frame members and springs. The rear ends of the springs are rigidly connected by a rod. The forward rear spring shackle is linked and this affords very easy movement when the spring is subjected to pressure.

The Buick delivery wagons are equipped with full elliptic springs at the rear, and the frame is strengthened by a cross member directly above the axle and in line with the centre of the upper halves of the springs. At either side a bracket is bolted that extends diagonally upward and ends in a wide seat to

which the upper half of the spring is bolted by clips.

The five-ton Kelly chassis is fitted with a forward rear spring bracket that is decidedly out of the ordinary. This is a casting that is bolted to the under web of the frame members, and instead of the usual arm there is a rectangular section with a web filling a considerable portion of the space within the rectangle. The spring shackle is rectangular, one section of which is fitted into the opening of the hanger and secured by a large bolt that passes through both sides. The spring eye is fitted into the opening of the shackle and mounted on a bolt. This form of shackle affords very wide bearing on the bolts and obviates all wear from side pressure that might result from the use of the ordinary form of shackle links.

Examples of Heavy Construction.

The four-ton Packard chassis has the rear springs under the frame, and the forward ends are mounted in shackles with flat side links, but to bring the spring close to the frame and afford ample bearing the bracket is placed in the channel of the frame member. The bracket bearing is the full width of the spring, being supported by webs. The links are large and the bolts extremely heavy. This design eliminates weight and insures abundant strength, as well as reduces the height of the chassis frame.

The three-ton KisselKar truck frame is mounted above the rear springs, and the forward shackles are carried on hangers that are cored to secure lightness, the size of the hangers as seen from the side of the chassis giving the impression of massiveness and unusual weight.

Body Carried on Three Points.

The suspension of the Parcel Post Kar is decidedly out of ordinary practise in that the frame of the machine is literally carried on three points. The frame is tubular and the forward end is underslung, being mounted on two long and nearly flat semi-elliptic springs, the body being supported on two brackets close to the front axle. The rear end of the frame is carried on a full elliptic spring secured to a bracket at the rear of the back axle, and so arranged that by removing a single pin the spring can be removed from

the axle. The side frame members terminate in curved arms or horns that are turned upward, and the upper ends are connected with a steel rod, this forming the forward member. The forward spring ends are pivoted transversely, but the rear ends are shackled to brackets mounted on the frame, the slow motion of the long springs being largely taken up by the shackles, which are of the side link type. The front springs are installed on seats that are fitted around the axle, the ends forming the yokes for the spring clips, and separating them sufficiently to give a large seating area.

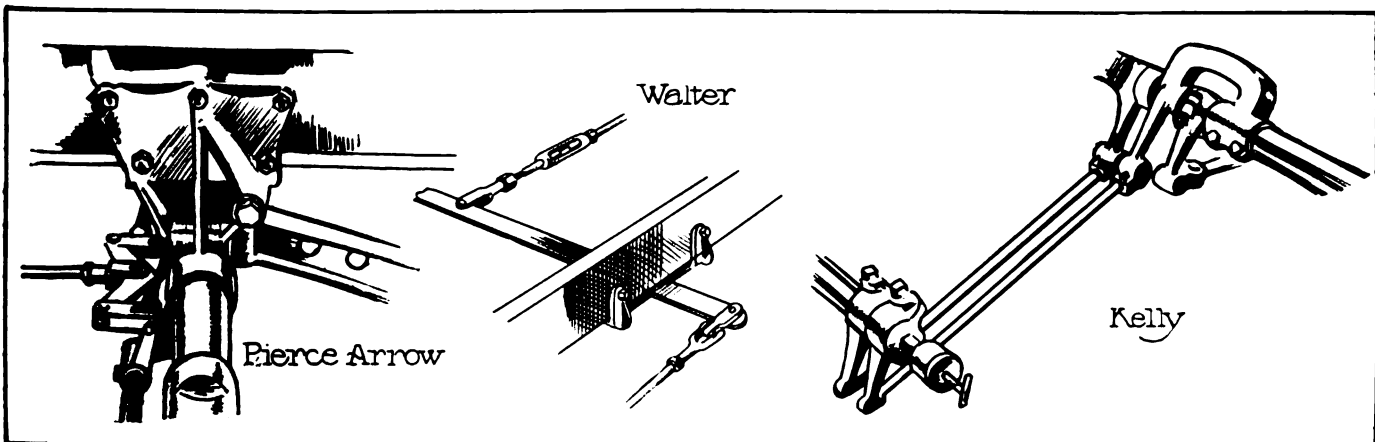
The Velie one-ton delivery wagon chassis is shaft driven and the rear springs are shackled at either end. The driving and braking torque is taken by a long torque arm at the left side of the driving shaft that is pivoted on the axle housing and spring supported at the forward end. This arm is I section, with the web of the rear end cut to reduce weight.

Some Recent Adaptations.

The driving shaft of the Pierce-Arrow two-ton chassis is supported in the centre of the frame by a cross member that is slightly dropped, and on which is mounted a self-aligning bearing of large size. Just forward of this is a universal joint that is completely housed to protect it against dust and abrasive substances. This construction insures that the shaft will be relieved of all side pressure and end thrust, no matter what the distortion of the chassis may be.

The rear axle of the 3000-pound Atterbury worm and gear driven chassis is somewhat out of the ordinary in that the spring seats are of unusual length to insure against stresses from the drive through the springs, and the steel axle housing is formed of a centre and two end sections bolted together. On the centre section is bolted the mounting of the worm shaft. The end sections of the axle housing carry the brake shaft brackets, which are cast integral and machined, instead of being separate fittings. The axle is trussed to insure maximum strength.

One of the features of the Pierce-Arrow two-ton chassis is the manner of equalizing the emergency brake pressure, which is done through linkage that



Practical Methods of Brake Linkage: The Equalizer of the Pierce-Arrow Two-Ton Chassis, the Simple Equalizing Device for the Double-Acting Rear Brake of the Walter Truck, and the Shaft and Sleeve Form of Brake Rod Connection of the Kelly Five-Ton Trucks.

is actuated by a direct forward pull, through a yoke that is linked to arms clamped to a divided shaft that is mounted in extensions of the brackets carrying the spring shackles. These brackets are connected by a tubular cross member that ties the frame and supports the forward end of the torque arm. This hanger also supports the forward ends of the radius rods. The assembly is illustrated by an accompanying sketch.

One of the simplest of equalizing devices is that used on the Walter front driven truck, there being a rod extending back in the centre of the chassis frame. This is connected with the service brake pedal, so that pressure applied to the pedal will actuate the transmission brake as well as the rear wheel brake, the effect being on all four wheels. The rod has a turn-buckle section and a yoke end that is pivoted on a cross bar that is slidable in guides beneath the frame side members. The ends of the cross bar are drilled for the bolts of yokes that are in turn yoked with the adjustable ends of the brake pull rods. Thus every possibility of pressure preventing the effective operation of the brake is obviated. The pull rod is also so connected with the emergency brake lever that movement of this increases the pressure upon the brake shoes in the rear wheel drums, but does not affect the service brake.

The brakes of the Kelly trucks are internal expanding in the rear wheel drums, and these are operated by pull rods at either side of the chassis, within the frame. The brake shafts extend across the frame, consisting of a solid shaft and sleeve, the sleeve carrying a yoke that clears the pull rod, the longest arm forming the lever, and the shaft carries a similar lever arm. Both arms are connected by pull rods with lever arms mounted on short shafts and sleeves at either side of the rear axle.

(To Be Continued.)

FROM THE RAILROAD'S ASPECT.

Fred A. Hortter of Boston, car accountant of the Boston & Maine railroad system, who has given his subject careful study and can speak with experience and knowledge from the viewpoint of the railroad corporation, will deliver a paper on "The Effect of Power Wagon Operation on Terminal Freight Congestion" before the Electric Vehicle Association of America at the headquarters at 29 West 39th street, New York City, the evening of April 24.

Mr. Hortter's observation covers a long period of time and the paper will be of much practical value, for it will deal with the aspect of the railroads and will present conditions as generally realized by transportation companies. From this point of view the estimate of the influence of the use of power wagons will be extremely interesting, and will undoubtedly be valuable for all persons shipping or receiving freight, for the possibilities for relief of congestion at terminals will mean a great deal to every business man. The subject will be approached from an operating viewpoint

and with a purpose of suggesting relief from existing conditions, rather than advocating the use of any particular type or form of machine. Officials of various railroad and steamship lines have been invited to be present, as well as representatives of different civic bodies, and an interesting and instructive discussion is expected to follow.

BATTLING WITH ARMORED TRUCK.

The Mexican constitutionalists, of whom Gen. Villa is regarded as the chief warrior, are now using a two-ton Mack chassis, which has been fitted with steel armor and adapted for use on rails or road. The wheels are armored so that they cannot be damaged by rifle fire, and the body is constructed of sheet steel with an entrance at the rear, this resembling a conventional building because of the straight walls and the slanting roof, while the hood and radiator are protected by a dome that drops nearly to the axle and carries the lamps. The chains are shielded by aprons that are mounted on the sides of the body. The wheels are so built that in comparatively little time they can be changed for either road or rail propulsion. The machine is equipped with machine guns and these and the arms and ammunition are carried within the body.

MOTOR 'BUS LINE BANKRUPT.

The Rapid Transit Motor Company, which for more than a year operated a public service in Indianapolis, Ind., White chassis fitted with omnibus bodies being used, has been adjudicated a bankrupt, and the property disposed of. Four of the machines have been bought for public service at Akron, O., and another machine has been fitted for service on a Wisconsin railroad, it being equipped with Indestructible steel wheels made with flanges by the Indestructible Wheel Company of Lebanon, Ind., for this work.

DID THIS WITH A KISSELKAR.

In November, 1911, W. R. Knights, a Minneapolis, Minn., manufacturer, bought a 1500-pound KisselKar delivery wagon and placed it in service. Since that time the machine has been driven more than 40,000 miles, often with an overload, and it has not as yet required an overhauling or repairs of consequence. The wagon is driven an average of 13 miles to a gallon of gasoline and a set of pneumatic tires lasted about 3500 miles.

NEW BATTERY CATALOGUE.

The Electric Storage Battery Company, Philadelphia, is issuing a new catalogue, SL, describing the Exide battery utilized with automobile lighting and starting systems. It contains very complete information and data on the subject of batteries and will be forwarded on request.

NO WHEEL TAX FOR NEW YORK.

City's Corporation Counsel Opinion Is That Proposed Ordinance Is Illegal.

The owners of all vehicles used in New York City, and especially the owners of motor trucks, are keenly interested in the opinion of Corporation Counsel Polk of that city, to whom was referred a bill for an ordinance presented by President Marks of the borough of Manhattan, which was, in many respects, if not wholly, the same as the ordinance which was introduced in the board of aldermen of the city by President McAneny about a year ago. This opinion is in effect that the proposed ordinance is illegal and cannot be enforced if passed.

The ordinance as drafted was far-reaching in its scope, providing for the licensing of all vehicles and the payment of a tax ranging from \$1 to \$1000, the basis being the weight carried upon tires, 800 pounds to the inch of width being the maximum permitted save in special instances for which permits might be obtained. The fee was to be proportionate to the weight of the vehicle and the load carried with it, with reference to tire width, and according to the provisions some of the larger vehicles now in use would be taxed the limit of \$1000 a year, while others could not be used save by the payment of fees for special permits that would largely exceed this figure annually.

The purpose of the ordinance was to establish a wheel tax and create a fund by annual licensing which would be devoted to the repair of the street paving, and to effect this means were to be provided for licensing all vehicles, for a system of inspecting and weighing, with varying penalties for failure to comply with the ordinance. Means for identifying the vehicles and establishing their capacity were provided in the ordinance. There was no provision made for vehicles that might be used in the city by transients, and besides affecting all owners in the city itself, it comprehended a tax upon many thousands who reside or do business in the suburbs, including the residents of New Jersey and other states.

The opinion by Corporation Counsel Polk is

quoted as stating the following: "The authorities in which, under the power to regulate the use of streets, ordinances regulating the weight of loads and the width of tires have been upheld, involve enactments directed to the prevention of such use as would injure the streets or interfere with their convenient use by others. The ordinance at hand permits the injurious use upon condition that compensation be made therefor. This is tantamount to the levy of a tax. Under the general power of taxation for the purpose of revenue, property is assessed with reference to its value and under a complete system prescribed in the charter. I am constrained to advise you, therefore, that the ordinance submitted cannot be legally adopted by your board".

OHIO REGISTRATION TAX CONTINUED.

The Ohio motor vehicle owners who fought to a successful issue the constitutionality of the registration rates fixed by the Warnes law, will continue to pay the fees that prevailed prior to Jan. 1. After the decisions relative to the Warnes law endeavor was made to force the passage of a bill that heavily taxed the motorists, but this failed, and just previous to adjournment the legislators passed the King bill, which practically continues the old rates, the only increase being that of dealers, who will pay a fee of \$20 for a blanket license instead of \$10. Under the new law the rates will be \$2 for motorcycles, \$3 for electric cars or machines, and \$5 for gasoline vehicles.

The Mott Wheel Works, Utica, N. Y., has appointed A. D. Trempe sales manager and the R. B. Abbott Sales Company, Detroit, Mich., does not now control the sales of the company.

The Autocar Company, Ardmore, Penn., has leased the building at 753-5 West Jackson boulevard, Chicago, Ill., for 10 years and will occupy it as a salesroom and service station.

A regular quarterly dividend of 1.75 per cent. on preferred stock was ordered by the directors of the Packard Motor Car Company, payable on and after March 14.



Vulcan Trucks Ready for Delivery by the Vulcan Motor Truck and Service Company, Pittsburg, Penn.—From Left to Right: Two-Ton Covered Body for W. V. McCaffrey, Washington, Penn.; Two-Ton Chassis for the Atlantic Refining Company, Pittsburg, Penn.; Five-Ton Chassis for the Bellevue Contracting Company, Bellevue, Penn.; Three-Ton Chassis for the East Liberty Wholesale Grocery Company, Pittsburg, Penn., and a Five-Ton Dumping Body Equipped Truck for the Valley Sand and Supply Company, Parnassus, Penn.

BUYS 38 WHITE WAGONS.

Big Pittsburg Department Store Opened with Full Motorized Delivery.

The Kaufmann & Baer Company, which has just opened for business one of the largest department stores at Pittsburg, Penn., planned its store and its service from a knowledge of conditions, the enterprise being developed with a view of affording the people of that city and vicinity the best that could be provided with reference to value and attention. Because of the necessity of meeting competition in every direction, unusual care was given to delivery, and after careful consideration of this subject motorized equipment was decided on as being most economical and satisfactory, for time was regarded as a very important factor.

Pittsburg is built on the side of a river valley, where the grades are more than ordinarily steep, and the city is laid out in form that may be likened to a hand, the fingers and thumb being the different sections reached by main thoroughfares, with few connecting avenues. This necessitates vehicles returning from any one of these sections to what may be considered the palm of the hand, or the centre, to go to any other. The topography of the city is such that most of the loads taken out for distribution must be hauled up-grade, and a majority of the trips the vehicles must be driven light down-grade, this making the work more severe than would be expected in conditions usually met with. Not only this, but the mileage necessary in serving the city and its suburbs is considerably in excess of what might be regarded as necessary in other cities. Because of these factors haulage in Pittsburg has always been more expensive than in the majority of cities of the country, and larger horse equipment has been necessary because of the long mileage and the heavy grades.

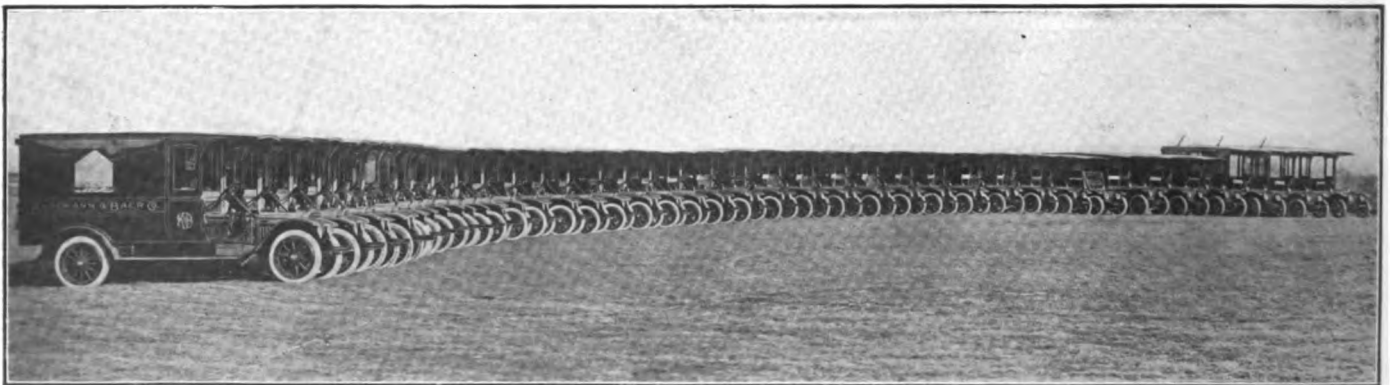
In selecting its delivery equipment the company decided to adopt one make of machine for the reason that this would practically standardize the service, that men who were experts with this machine could be employed as drivers and mechanics, that this would minimize the stock of parts to be carried, that the

complications arising from inexperience with one of several makes would be avoided, and that the organization could be the better trained and systematized. An order was placed with the White Company for 38 wagons, 32 of these of 1500 pounds capacity, to be used for route and package distribution, and six 3000-pound wagons, for handling furniture and other bulkier goods, as well as hauling freight and other shipments. All of these vehicles were equipped with panel bodies and were identical in every respect, the difference being merely in size. All of the wagons are equipped with pneumatic tires, the 3000-pound machines having dual shoes on the rear wheels. The order was the largest ever given by a Pittsburg firm, and not only places the company in the position of being one of the largest users of motorized equipment, but among the leaders of department stores in delivery and transportation efficiency. When the machines were shipped from Cleveland, O., they filled an 18-car special freight train, and upon delivery, which event attracted not a little attention in Pittsburg, the company was in readiness to begin service with every probable requirement amply provided for.

The H. J. Koehler S. G. Company, 1709 Broadway, New York City, has published a very attractive and complete catalogue descriptive of the Koehler 2000-pound wagon, which illustrates the 10 types of body supplied by this concern, and gives a great deal of useful information relative to construction and equipment. Copies will be sent on request.

After a winter experience with a Palmer-Moore delivery wagon, the American Optical Company, Southbridge, Mass., ordered a second machine. The company expressed itself as perfectly satisfied with the service obtained with the vehicle and commented upon the prompt attention of the maker to all matters referred to it.

The purpose of the Hydraulic Truck Company of Los Angeles, Cal., if present plans are realized, is to establish a plant in Colton, Cal. W. E. Barnes is president of this company and D. L. Whitford is the general manager.



The Fleet of 38 White Delivery Wagons Purchased for the Service of the Kaufmann & Baer Company's Department Store, Pittsburg, Penn.

NO PRACTICAL MOTOR TRUCK FENDER.

Every Type Tried in America and Europe Increases Danger in Traffic Instead of Affording Protection--Innumerable Inventions Absolute Failures.

AN INJURY or fatality resultant from a motor vehicle striking a person in its path immediately causes the assumption by a very large proportion of the public that protection should be afforded by equipment carried by machines. The thought is perhaps logical, but how this condition can be met is a subject that has received a great deal of attention by those who have the welfare of the public, the motor vehicle industry, and the owners of the machines to consider.

The prevailing opinion appears to be that pleasure cars, which are driven at fast speeds, should not be required to afford the same degree of safety demanded from freight vehicles, which are rarely driven fast and are almost universally better controlled. Facts that are given with relation to highway traffic accidents seldom, if ever, differentiate between the two classes of vehicles. Surprising as this may appear the people apparently think that if a pleasure car is involved in an accident there is a question as to the responsibility, but if the vehicle is a truck or wagon the conclusion is that the driver was at fault and that the public ought to be better protected.

This decidedly hazy condition of public opinion relative to traffic accidents, and the agitation that may follow a singular or peculiar circumstance, has been in large measure responsible for local legislation, or at least proposal of such, as will necessitate fender equipment on freight motor vehicles. Those who own and drive pleasure cars, who no doubt drive as rapidly as the law will permit, who would not for a moment consider a proposition to equip their cars with fenders, seemingly approve measures that would cause the installation of such devices on machines owned by others, or at least do not oppose them. The owners of motor service wagons are a comparatively small number in any community, and remonstrance to any proposal to compel the use of fenders is regarded as antagonistic to the general welfare, no matter how logical or sane these objections may be. In other words, the public assumes that the owners of motor trucks and wagons seek opportunity to injure people and take life rather than pay the cost of what would protect.

The first municipality to enact an ordinance requiring fender equipment was Detroit, which has recently repealed this measure, and this was followed by a similar ordinance enacted in Chicago. Later on an ordinance offered in the Cleveland, O., city council was not favorably reported by the committee to which it was referred, and the Milwaukee, Wis., city council rejected an ordinance having practically the same purpose.

The experience with the ordinances of Detroit and Chicago has been followed very carefully by the industry and its various organizations, as well as the industrial and trade press, with a view of ascertaining the results from the practical utilization of such fenders as have been developed. Broadly, it may be stated that no satisfactory fender has yet been conceived, and this is in line with the experience abroad, where

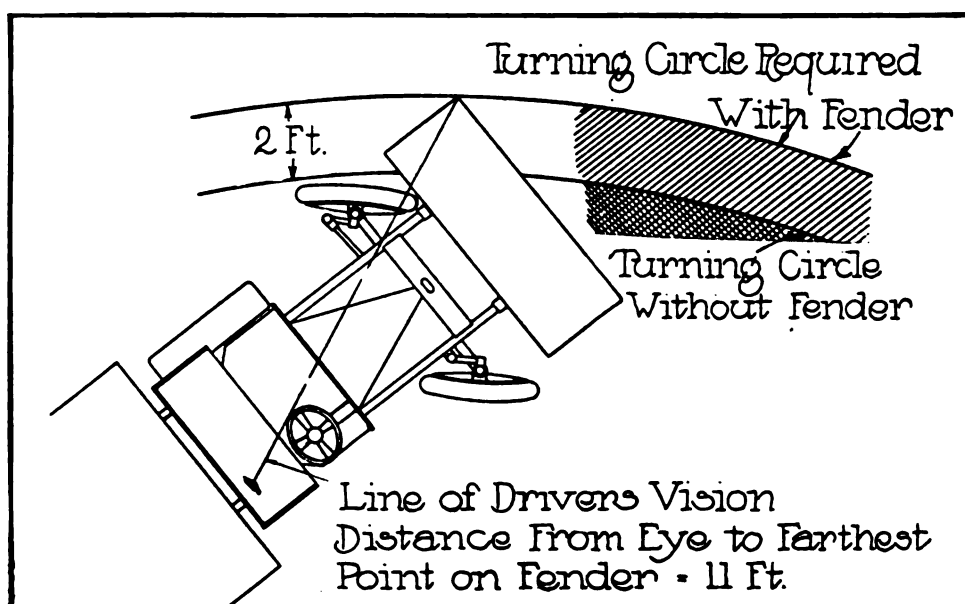


Diagram Showing the Additional Space Required in Traffic by a Five-Ton Truck Fitted with a Fender Extending 28 Inches, This Covering a Radius Two Feet Greater, with the Extreme Projection Concealed from the View of the Driver.

the English, French, German and Italian governments exercise a much more rigid supervision and insist upon extremely careful observance of all regulations intended to afford safety.

The desire for greater protection may inspire city councilmen or others to advocate the use of fenders without a practical knowledge of the subject, and the absence of sufficient and definite information may lead to the enactment of ordinances that will be ineffective as to results; will cause material expense to motor vehicle builders, dealers, owners and operators, and will possibly involve the question of responsibility.

The possibilities from agitation of fender equipment has impelled the National Automobile Chamber

of Commerce to learn from service vehicle manufacturers and users in Detroit and Chicago the effects of the ordinances, and the opinions as to the practicability of fenders as applied to machines in those cities. No one of more than 20 responses to inquiries has been favorable to the use of fenders, and practically all point out the inefficiency of those that have been tried, as well as the possibility of increase of accidents through their use. Emphasis is made that both the Detroit and Chicago ordinances were enacted hastily and despite the facts that no fender had been proven sufficient and none could be built in sufficient numbers to meet the demand in the time allowed for equipping the machines.

The Detroit ordinance is:

Section 1. That all persons, firms or corporations now and hereafter owning or operating motor vehicle trucks of one-ton capacity or more in the City of Detroit, shall provide all their cars now or hereafter in use with fenders designed to catch and sustain any human being who may be in the way of such car, and so mechanically constructed that such fenders may be lowered or raised by the operator in charge of said motor vehicle truck, or such other fenders as may be deemed best to carry out the intent of said ordinance, such fenders to be of such design as the police commission shall have certified in writing to meet with their approval.

Sec. 2. It shall be the duty of the police commission to examine and pass upon all designs of such fenders submitted to them by any person, firm or corporation owning or operating any motor vehicle truck within the City of Detroit, and give written certificate to such applicant of his approval or disapproval of such designs.

This ordinance provides that a fine of not less than \$10 and not more than \$100 may be imposed for every day a vehicle is operated in violation of the regulation, or a penalty of 90 days' imprisonment in the house of correction for each offense may be inflicted.

The Chicago ordinance provides as follows:

Sec. 2650½. It shall be unlawful for any person, firm or corporation to use and operate in the City of Chicago any auto car or truck for the purpose of conveying therein bundles, parcels, baggage or wares, merchandise or other similar articles, unless said auto truck or car is provided with a fender as in the case of street cars operated and used within said city, or such design as may be approved by the board of inspectors of public vehicles.

In Detroit the ordinance became effective Oct. 1, but upon representations made by truck owners the time was extended to Nov. 1 by the police commissioner, because he could not approve any fender submitted, and later extended to Jan. 1 by the same officials. After that time endeavor was made to enforce it, but it caused such hardship for motor vehicle owners because of the impossibility of obtaining a satisfactory fender, that in March the ordinance was repealed. The experience of the police commissioner was that there was no apparent diminution of accidents because of the use of fenders.

The experience with reference to approving fenders that might serve the purpose specified in the Chicago ordinance was much the same as in Detroit, and from the fact that no fender could be found that met the requirements, and to enforce the ordinance would mean the practical cessation of service vehicle use and result in extreme hardship for business men, no attempt has been made to enforce it. But the agitation resulting from the ordinance has brought about the creation of a traffic commission that is studying

street congestion and accidents with a view of recommending measures that will afford relief.

Those who have observed conditions and studied the subject of fenders are very generally united in criticism, which may be summarized as follows:

That such fenders as are now available are as likely to cause injury or fatality as to prevent, that they increase traffic confusion, that they are easily damaged and made inoperative, that no satisfactory or effective type of fender is known to truck builders or users, and that there is no more need for such equipment on trucks than on pleasure cars, wagons or motorcycles.

In connection with this an analysis of the records of street accidents in Cook county, made by the coroner of Chicago, is of interest, from the fact that this established the fact that motor vehicles have caused about half the number of deaths resultant from horse vehicle accidents when the number of miles travelled is taken as a basis.

An investigation of the records of deaths from motor vehicle accidents in Milwaukee, made by the Stegeman Motor Car Company, showed that only about 10 per cent. were caused by motor trucks, and that in no instance would fenders have prevented death, as the victims fell between the front and rear wheels.

The Pierce-Arrow Motor Car Company has published a pamphlet dealing with the subject in which are summarized arguments for and against the use of fenders, prepared by its engineering department, and this is being distributed to those who are desirous of learning facts that should receive consideration. Statement is made that a fender that would save life, provided that it was made in a manner and of material that would endure, could be easily applied and kept in good repair, would be welcomed by all. Such a fender would be adopted, but legislation compelling the adoption of any unproven device that might be offered for the purpose is deprecated. The report of the public service commission for the first district of New York State, which was published Dec. 29, 1908, on car fenders and wheel guard tests, is referred to. This report can be purchased at 150 Nassau street, New York City. The report deals with tests made with life size dummies, very carefully made to represent actual conditions, with the comment that these trials were with street cars running over a fairly good roadbed in a fixed direction. The comment is made that the gist of this report is that very careful and elaborate tests should be made before deciding on a fender, and that many fenders which would seem to be valuable were more dangerous than if not used.

The following statement is made relative to the use of fenders on trucks, and the instance referred to is diagrammatically presented. As illustrated the sketch shows a fender, designed by a well known concern, that projects 28 inches in front of the machine, which is 78 inches width, and this adds 12 per cent. to the overall length of the Pierce-Arrow truck and 15

per cent. to the overall length of the two-ton wagon. This is objectionable in that it is added at a point in front of the driver. On the five-ton truck the driver's eye is 11 feet away from the fender extremity, and by reason of the radiator, mudguards, etc., obstructing his view, he is not able to judge of the wisdom of dropping the fender or not. The statement continues:

Again, how is he to drop his fender? One hand is on the steering wheel; the other at the brake lever; a foot on the clutch pedal and another on the brake pedal. He must be a wise, cool-headed driver who would remember what to do in an emergency.

To our mind, the greatest danger lies in the projection of the fender when turning corners. The driver's attention is concentrated in the direction at right angles to where his fender is probably breaking a traffic policeman's leg. Besides one wheel is left unguarded at this operation. On our five-ton truck, a straight fender nearly 13 feet wide would be required to thoroughly guard the track. A curved fender would be somewhat shorter but horribly complicated.

A device which does not fit closely to the ground is not a life guard—it is a trap. It is practically impossible to drop a fender closely to a rough road without its being damaged by the road to such an extent that it is quite conceivable it would present a jagged, spiked weapon to the unfortunate victim, instead of a comfortable couch.

Most people would rather take a chance and take advantage of the 12-inch clearance between the wheels of a truck than of being hit with any fender seen yet.

A fender would certainly trip them up and throw their heads against the radiator with some force instead of rebuking carelessness in a gentle manner.

In conclusion, let us read a letter under date of Dec. 19, 1913, from Mr. Iden, chief engineer of the London General Omnibus Company, which, you will remember, runs about 3000 omnibuses through very congested traffic. The damage claims of this company are such that it is very earnest in its search for a real life saver.

"In reply to your letter of the 4th instant, during the past year we have made up and tested a number of front guards, but we regret to say that up to date we have not found one efficient enough to warrant fitting to our 'buses'.

"The early types of lifeguards, which we tried, were more in the nature of fenders or gates, but these were found unsatisfactory in cases where a person had fallen prone when the limbs were invariably drawn under the guard, and more damage was done than if there had been no guard and they had been run over by the wheel.

"We have tried a trip guard similar to that used on tram cars, but this, to be effective, had to have too great a projection to allow us to adopt such a device.

"Other types of devices have been in the nature of brushes constructed to sweep the person in front or aside. This was very unsatisfactory, as it collected so much road refuse, besides in dry weather creating such a dust that it was impossible to leave such a device on the 'bus'.

"So far, the most effective device which we have tried has been in the nature of a rubber covered wheel, which is held against the road wheel by a slight spring and, being in contact with same, caused the rubber covered wheel to rotate in a reverse direction, thus, when this met an object, it would tend to roll it away rather than draw it in under the wheel.

"All our earlier devices were of our own design, but latterly we advertised in all the leading journals for suggestions and, as a result, received 4700 replies and, included in these, was the one with the wheel rotating in the reverse way to the road wheel, as before mentioned, but other than this, no suitable guard was found among all the devices submitted".

Mr. Iden added a postscript that the wheel referred to is not sufficiently good for them to use.

In connection with the sketch illustrating the article it will be noted that this shows the possibility of a fender projecting two feet or more over a curb, if it were not so low as to strike it, outside of the curve made by the wheels, and this condition always obtains when turning. And unless the fender were increased in width it would not protect against the inner front wheel when turning short. Fenders must have several inches clearance to provide for rough roads, crossings, car tracks and other ordinary road obstructions. In the event of a fender being damaged it cannot be made operative immediately, and this means the loss of the service of the vehicle.

But no fender will protect against violently strik-

ing some other parts of the vehicle, for the wheels are not the only parts to be feared, and these would not in any way protect against a person falling between the wheels.

WILL EXPORT FROM BOSTON.

Plans have been perfected by which the Lauth-Juergens motor trucks and wagons will be exploited in the West Indian Islands and South America, and the shipments exported will be made by the Myer Abrams Company, 159 Vassar street, Cambridge, Mass., the New England distributor. The agencies have been established in a number of the principal West Indian and South American ports and arrangements made so that the purchasers of the Lauth-Juergens machines will be afforded a practical and satisfactory service.

Samuel Rolfe has been appointed sales manager of the Signal Motor Truck Company, Detroit, Mich., resigning a position as district sales manager for the Federal Motor Truck Company of the same city, which he had held for several years, to accept the appointment. He is now engaged in making new agencies for the Signal machines.

During the Boston motor truck show the Peerless Motor Car Company of New England, distributor of Peerless cars and trucks, did not make exhibition, but instead had a special display of service machines at its headquarters at 660 Beacon street. The showing included practically every type of Peerless machine built.

At the annual meeting of the Driggs-Seabury Ordnance Corporation, Sharon, Penn., John Stevenson, Jr., was re-elected president, William Flinn of Pittsburgh vice president, R. S. Pratt secretary and Harry Myers treasurer. The board of directors was unanimously re-elected.

If a bill now pending in the New York legislature becomes law 13 or more owners of motor vehicles not used in trade or manufacture or operated for hire may incorporate for the purpose of insuring on the mutual plan against damage, accident or legal liability.

The plan of Postmaster Nagle of Detroit, Mich., to abandon the use of animals for delivery and collection for the postoffice of that city and to completely motorize the equipment in use, has been approved by the departmental authorities.

Edward H. Busby, well known in the industry and trade, has resigned as sales manager of the Anderson Forge & Machine Company and has been appointed general sales manager of the Ferro Machine & Foundry Company, Cleveland, O.

EXPLOSIVE-CARRYING TRUCKS.

The oil fields of Oklahoma include a large area of country that has been but little developed. The possibilities for finding petroleum has caused a great deal of prospecting, however, and this search for oil has been in any direction that fancy or indication directed. When wells have been drilled they are generally in localities sparsely inhabited, and sometimes remote from towns. The drilling of wells necessitates carrying material and supplies sometimes long distances, frequently over country that has hardly a trail, and haulage is not only difficult, but considerable time is required.

After wells have been drilled it is occasionally necessary to explode nitroglycerine in them with a view of starting the flow of oil, and for this reason considerable quantities of this high explosive are carried about to the different places where work is in progress. To do this work with horses is costly and dangerous, and for this reason the companies that manufacture and distribute nitroglycerine have found it advisable to use vehicles that would be more thoroughly under the control of the driver, as well as having long mileage. That is, they have taken kindly to motor wagons, which have been specially equipped so that the explosives may be carried without danger.

The American Glycerin Company, with headquarters at Battersville, Okla., has now in use five Adams 3000-pound wagons, which have been built expressly for this work. The machines have 42-inch wheels, which gives large clearance on the rough roads and cross country hauls, and the chains are enclosed to prevent wear and to avert danger. The bodies are of the express type, but are fitted with special boxes that have covers that may be locked and are divided into compartments, each of which will carry a single can. The capacity of the wagons is 720 quarts. With loads that have sufficient explosive energy to devastate a

large area if exploded, these machines are driven hundreds of miles each month, covering rough country, in all kinds of weather, and giving the best of satisfaction.

CABOT MECHANICAL RECTIFIER.

The Cabot mechanical rectifier, designed by Sewall Cabot, a well known electrical engineer, was described and demonstrated at the March meeting of the New England section, Electric Vehicle Association of America, which took place March 25 at the office of the Lynn, Mass., Gas & Electric Company, with James F. Dubois as the host.

The possibilities for the machine were told of by Mr. Cabot. It is a rectifying commutator similar to a rotary converter, but without moving parts. The claim is made by the inventor that a rectifier of 100-ampere capacity will operate at unity power factor with efficiencies of approximately 20, 18 and 12 per cent. more comparatively than the motor-generator set, the rotary converter and the mercury arc. After the address the machine was discussed to considerable length.

Announcement was made that at the May meeting Frederick Hortter, car accountant of the Boston & Maine railroad, would discuss traffic problems. The date and place of meeting have not been determined.

PACKARD TRUCK BASEBALL LEAGUE.

The motor truck sales organization of the Packard Motor Car Company has been constituted the Packard Truck Baseball League, which began its season March 1, and is now striving for a pennant and a \$500 bulldog. The league consists of 10 teams that compete three times with each other during the season. The "players" have signed contracts and all the formalities that are regarded as essential to organization have been carried out. In the competition sales are recorded as runs, and the team making the largest score during the period is the winner. The managers are: President Henry B. Joy, Vice President A. D. Waldon, General Manager Alvan Macauley, Sales Manager H. H. Hills, President of Branches M. J. Budlong, Consulting Engineer Russell Huff, Alvan T. Fuller of Boston, Cuyler Lee of San Francisco, Earle C. Anthony of Los Angeles and Ginder Abbott of New Orleans. Results of the progress of the competition are published in the "Packard Winch", which is issued daily.



Adams 3000-Pound Wagon Used for Distribution of Nitroglycerine in the Oil Fields of Oklahoma, Fitted with Special Equipment.

GOODYEAR OFFICES UNITED.

The Goodyear Tire & Rubber Company has determined to consolidate its sales department in New York City with a service station at Long Island City, and the selling organization will be removed from 1972 Broadway and located at Honeywell street and Jackson avenue, in a new building that will be ready for occupancy next month. The new station is of large proportions, it being a six-story and basement steel and concrete structure with 270 feet frontage. The equipment will be complete, and the station will be prepared for any work that may be required by customers.

FORMAL DISSOLUTION EFFECTED.

The supreme court for New York county, New York State, has granted an order of dissolution for the Automobile Board of Trade, which has been succeeded by the Automobile Chamber of Commerce, Inc., every formality having been complied with, and the organization existing in name only. The Automobile Chamber of Commerce has now possession of the records and property of the Association of Licensed Automobile Manufacturers and of the Automobile Board of Trade and the National Association of Automobile Manufacturers.

Harry M. Snyder, secretary of the Reo Motor Truck Company, and secretary and director of the Reo Motor Car Company, Lansing, Mich., has resigned those positions and will spend the next year in travel and recreation. He has been prominent in the industry for about 12 years.

The American Bronze Company, Berwyn, Penn., has plans perfected for the immediate erection of buildings that will increase the foundry capacity 40 per cent. and the finishing department 75 per cent. A recently completed and finely equipped laboratory is now in active use.

T. B. Waller has been appointed assistant general manager of the Lincoln Motor Truck Company, Sacramento, Cal., which is to manufacture the Lincoln truck. He was formerly connected with the Lincoln Motor Sales Company, Seattle, Wash.

The Jackson Metal Products Company has been organized with John Stern as president and L. M. LaDuke vice president, and is to locate at Jackson, Mich. It is to specialize the production of fenders, radiators, etc., and is said to have abundant capital.

The Federal Motor Truck Company, Detroit, Mich., has appointed R. P. Spencer, formerly associated with a well known Milwaukee industry, sales and advertising manager. He has assumed the duties of the position.

ONE SHIPMENT OF 38 TRUCKS.

The White Company, Cleveland, O., recently made what is believed to be the largest single shipment of motor trucks ever sent out from a factory, this consisting of 38 vehicles contained in 19 box cars and consigned to Pittsburg, where the machines are now in service. The train as made up was 700 feet long.

SCHMUNK MADE SALES MANAGER.

R. J. Schmunk, after service of about seven years with the Peerless Motor Car Company, Cleveland, O., has been made general sales manager, in which capacity he is executive of the entire selling organization of the concern. He has been associated with the industry since its inception and has been connected with several concerns in different parts of the country, most of the time devoting his endeavors to selling. Because of the nature of his work he has become known to thousands of motor vehicle dealers in all sections of the country.

When he joined the Peerless organization he was a salesman, but within a short time he was advanced to sales manager, in that capacity having charge of the distribution of pleasure cars.

About a year ago he was made director of sales, and he continued in that position until his last promotion. He now handles the sale of both pleasure and service vehicles.



R. J. Schmunk, General Sales Manager, Peerless Motor Car Company.

PIGS RIDE IN TRAILER.

Novel uses are sometimes made of motor vehicles, but one that is amusing is that adopted by T. E. Ely, Brewster, Minn., who is known throughout the northwest as a raiser of blooded porkers. He has a piggery that covers a large area and he sells his stock in all parts of the country. Shipments by railroad are frequent and are made in the usual way by car, but where a customer is within a reasonable distance, or an exhibit is to be made at a fair, one or more pigs are placed in a special trailer that is drawn behind Mr. Ely's motor car and hustled over the road at comparatively small expense.

CROSSING THE HUDSON.

Motor Truck Club Members Hear Projects for Bridge and Tunnel Explained.

The North or Hudson river is between the business interests of New York City and the railroad and shipping terminals that extend along the New Jersey shore in Jersey City, Hoboken and Weehawken, the only connection between the two for vehicles being the different ferries, most of which are operated in connection with the railroads. For passengers there are the Hudson tubes, which have diminished pedestrian congestion, but the increasing volume of business has been profitably taken care of by the ferries.

The use of the ferries has had the effect of concentrating the vehicles used for passengers or for freightage between Manhattan and New Jersey in certain streets of the Metropolis, and in the cities on the Jersey side, and because of the necessity of loading and unloading, as well as transit, these have been practically blockaded for years, while the piers and terminals have been congested nearly to the same extent as in New York City.

The conditions have been realized and understood for years, and different propositions have been made for permanent relief, but generally these were theoretical rather than practical and could not be brought about save through the expansion of terminal and dock facilities, which is impossible save at enormous expense and the co-operation of the State of New Jersey with the national government and the municipalities and the owners of the properties.

The Motor Truck Club of America, at its meeting March 18, to which were invited the members of the Electric Vehicle Association of America and other organizations having similar interest in the better regulation and systematization of street traffic, listened to explanation by members of the New York State bridge and tunnel commission, and the New Jersey interstate bridge and tunnel commission, of the proposed bridge and tunnel between Manhattan and Jersey City. The meeting, which was at the Automobile Club of America, was largely attended and much interest was manifested.

The plan as proposed comprehends the construction of a tunnel at Canal street, or near that point in New York City, extending to Jersey City, and a mammoth suspension bridge from 58th street and Eleventh avenue that will cross the river about 3.5 miles above the tunnel, both to be largely for the benefit of vehicular traffic. The tentative projects were illustrated, sketches and plans being shown on a screen by stereopticon, these being explained by the engineers.

The possibilities for economy and better facilitating the handling of freight, as well as the financial aspects, were explained by Senator Martin Saxe, counsel for the New York State bridge and tunnel commission, and by Senator J. A. C. Johnson, counsel for

the New Jersey interstate bridge and tunnel commission. The cost of the bridge is estimated at \$42,000,000 and of the tunnel \$11,000,000, making a total of \$53,000,000 for the two. It is proposed that the expense shall be largely, if not wholly, borne by the two states that will be connected. Bills authorizing the construction and the financing of the work are now pending before the legislatures of the states.

According to the plans suggested, and which will probably be recommended, the bridge will be 1.57 miles in length and will have a single span of 2880 feet, which is about 1100 feet longer than the longest single span ever constructed, but as an engineering possibility it is regarded as very practical. The main piers will be 555 feet in height, or as high as the Washington monument, above the bedrock foundation, and 350 feet above tide water, the total width will be 204 feet, and the clearance will be 175 feet above high tide. The proposition is to have a single deck which will support the roadways and railroad tracks, with wide sidewalks at the sides. At the New York side the approach to the bridge would have a three per cent. grade, and it would be level on the New Jersey side. The plan was described by Henry W. Hodge and C. D. Snyder of Jacobs & Davies, they representing the engineers for the two commissions. The tunnel was described as approximately 1.75 miles in length, to consist of twin tubes 14 feet high and with 17-foot roadways, with maximum grade approaches of three per cent., and with large elevators that would hoist and lower from the street levels to the roadways or vice versa the vehicles that were to go to points on the river fronts. The estimate of actual time saved in crossing was from 10 to 15 per cent. of that now required for ferriage. As it is estimated that about 6,500,000 vehicles are annually carried by the ferries, the aggregate of time economy alone is enormous.

The Automobile Equipment Company has been incorporated at Cincinnati, O., with capital of \$100,000, by George W. Platt, Arno Merkel, H. E. Maffey, M. L. Freeman and Alice DeCharmes, to manufacture and deal in automobiles and motor trucks.

The Hoboken & North Hudson 'Bus Transportation Company has been incorporated at Hoboken, N. J., by W. O'Neill, W. A. Kavanagh and E. F. Martin, with capital of \$1,250,000, and will engage in a general passenger and freight transportation business.

The Merchants' Motor Truck Manufacturing Company has been incorporated at Chicago, Ill., with capital of \$100,000, by W. Schulze, J. W. Misk and C. A. Martin, under the Delaware law, and will manufacture and deal in motor trucks, motor vehicles, etc.

At the annual meeting of the Vacuum Oil Company at Rochester, N. Y., the charter was extended for 50 years and the old board of directors was elected.

STATES REJECT UNIFORM MOTOR VEHICLE LAW.

WHAT was believed by some to be a promising opportunity for the enactment of a reasonably uniform motor vehicle statute by a number of the eastern states has disappeared, and apparently the endeavors of those who devoted time and study to the subject have been wasted, simply because of assumption that the activities of those interested in it were not authorized by the different states. That is, this was the primary argument made by the legislators who received the report made by the committee that represented the different states. Had the committee been named by the authority of legislative action in each of the states there would have been necessity for recognition of the report, but the manner in which the committee was appointed, and the fact that the members acted without definite instruction, being actuated by their own judgments, afforded opportunity for those who assumed their own rights encroached upon to nullify the endeavors of the committee.

The committee was composed of Secretary of State Albert Phillips, Highway Commissioner Charles J. Bennet and Alfred H. Terry of Connecticut; Judge Sylvester Townsend and Charles S. Guyer of Delaware; Attorney-General Scott Wilson, Lyman H. Nelson and J. C. Scates of Maine; Chairman William D. Sohler of the state highway commission of Massachusetts; Highway Commissioner Harry Roe, President H. M. Rowe of the Automobile Club of Maryland and H. M. Luzius of the same organization of Maryland; Samuel W. Taylor, Fay C. Parsons and A. J. Deer of New York; Motor Vehicle Commissioner Job H. Lippincott, Highway Commissioner Edwin A. Stevens and George L. Burton of New Jersey; Highway Commissioner E. M. Bigelow and Robert P. Hooper of the Pennsylvania Motor Federation of Pennsylvania.

The committee members were assumed to be appointed by the governors of the eight states named, and that there was sufficient sincerity and actual interest obtaining on the part of the legislators to justify consideration of a law that would be uniform and, from this point of view, materially beneficial to the motorists and the people. The committee held several meetings and discussed the subject carefully. A report was prepared, first in preliminary form, and after consideration and revision this was adopted with the recommendation to the legislatures that it had the approval of the representatives of the different states. While the report may not have been ideal from the viewpoint of the owners of motor vehicles, there is no doubt that it was a distinct advance as compared with the statutes of the states as a whole, and in addition to this it afforded a much better protection to the people from the fact that the weaknesses were corrected and that one might drive for hundreds of miles with absolute knowledge of motoring regulations and requirements. Not only this, but sufficient penalties were provided for violations so as to insure that

the provisions of the law shall be strictly observed.

The reports made to the different legislatures by the committee were received, considered by committees and invariably rejected, the value of the uniform statute, which was one of the chief reasons for the consideration of the subject, being disregarded, and trivial or inconsequential arguments made to controvert the real purpose of the measure, which was designed to meet every condition broadly. The experience of the men who devoted their time and attention to the study and investigation of the proposition, purely for the benefit of the public, is such that there is small probability that they would care to repeat their work, and they are generally in a frame of mind that the word disgusted mildly expresses.

WANTS \$66,666.37 FOR TRUCKS.

Herman A. Metz, formerly comptroller of New York City, a former congressman, is the defendant in a suit brought by the R. & L. Company of New York, distributor for Garford trucks, the plaintiff seeking to recover a balance of \$66,666.37 which is claimed to be due for the balance of the purchase price of 65 trucks in the service of the New York Mail Company.

The New York Mail Company was contractor to carry some of the mail in Manhattan south of 42nd street, and it disposed of the greater part of its horse equipment and purchased trucks. The contract expired June 30, 1913, and the contract was awarded to the Postal Service Company. The New York Mail Company was supposed to be a heavy loser through the contract. The defendant in the action is claimed by the plaintiffs to have had a substantial interest in the company.

The Precisions Kugel Lager Works, Fichtel & Sachs, maker of the F. & S. bearings, for which the J. S. Bretz Company is American selling agent, sold Feb. 1 its 33,000,000th set of ball bearings. The company was founded in 1904 by Ernst Sachs, the patentee of the bearing, and it now has factories that employ 4000 workers.

E. M. S. Young, formerly manager of the Superior Steel Company, Carnegie, Penn., and general manager of the Alleghany Steel Company, Brackridge, Penn., has been made general manager of the Standard Gauge Steel Company, Beaver Falls, Penn., and John J. Tyler has been made director of sales of the same concern.

William H. Nash, formerly with the McClernan Steel Company, Chicago, and W. K. Prudden of Lansing, Mich., has been appointed selling representative at Detroit, Mich., for the Mott Wheel Works of Utica, N. Y., with offices at 809 Woodward avenue.

BUYS 105 KELLY TRUCKS.

Big Order for Machines for Passenger Service in Southern California.

The Pacific Motor Coach Company has, according to the statement of the Kelly-Springfield Motor Truck Company, Springfield, O., ordered 104 special five-ton truck chassis and one two-ton chassis, a total of 105 machines, which are to be used in passenger service in Southern California.

The Pacific Motor Coach Company has been organized at Los Angeles with capital of \$500,000 for the purpose of establishing motor vehicle transportation service lines between different towns and cities in the lower section of the state, and to inaugurate these as quickly as the equipment can be delivered. The executive offices are to be at Los Angeles and the machines will be of the double-deck type used abroad and in New York City and several other American municipalities.

A number of the lines will radiate from Los Angeles, serving Venice, Long Beach, San Pedro, Pasadena and other suburbs and residential sections. Others will serve more distant points. The first lines will be in operation by July 1 and the company hopes to have all of the machines in use by Jan. 1. Of the chassis ordered the five-ton machines will be used for passenger work, and the two-ton chassis will be equipped with a gasoline tank and will distribute fuel to the different stations.

R. G. Munn is president of the Pacific Motor Coach Company and Murray A. Harris is vice president. After considering the Kelly machines in Los Angeles they came East, and passed five days at the factory at Springfield, O., and then continued on to New York City, where the sale was consummated. The first 33 chassis will be delivered as quickly as possible, and the others will be shipped on a monthly schedule.

REO FACTORY ACTIVITIES.

The plant of the Reo Motor Truck Company, Lansing, Mich., is now being worked to its full capacity, and some departments of it overtime, to meet the demand for the model J machines, and this despite the fact that last autumn a large amount of machinery was added to the equipment and preparations made for producing the trucks in much larger numbers. The pleasure cars are now produced at the rate of 65 a day, and shipments have been as high as 90 in a day. The factory now has more than 2000 orders for April delivery.

The assets of the Cleveland-Galion Truck Company, which include the plant at Galion, O., have been purchased from the receiver of the concern by the stockholders, who purpose to rehabilitate the concern. The company builds an electric internal freight truck.

WANTS CONVICT-MADE BRICK ROADS.

Governor Glynn of New York proposes that the state shall build roads that will be with such surfacing that they will endure from 20 to 30 years and will cost but trifling sums for maintenance. He stated in a message to the legislature that the state must either change its policy, or prepare a perpetual yearly road tax of \$2 on every inhabitant of the state. This meant a translation from highways such as are now built, having an estimated endurance of 10 years and costing \$1000 annually to maintain, to those that will endure for two to three times the period and cost from \$10 to \$60 a mile. He believed it would be economy for the state to build brick roads at a cost of \$25,000 a mile instead of macadam roads in all places where the motor vehicle traffic is large.

The state issued bonds to the value of \$50,000,000 to build 12,000 miles of state road, these to run for 50 years, and as the roads are now constructed Governor Glynn believes that they will be in need of reconstruction 40 years before the bonds to pay for the original work will mature. He believes that while the concrete road costs from \$2000 to \$3000 a mile more than high grade macadam, and brick roads from \$10,000 to \$12,000 more a mile than macadam, the saving of the brick construction would be very large. He makes a proposal to establish camps of convicts in connection with plans for the making of vitrified brick to be established by the state, so that, without the normal expense for brick the cost of brick roads may be reduced to a figure not greatly in excess of macadam.

FUTURE OF MORA COMPANY IN DOUBT.

The future of the Mora Power Wagon Company of Youngstown, O., which has been in the hands of the courts since December, has not been determined, and there is no immediate prospect of a settlement. Frank H. Adams, treasurer of the company, was made receiver upon his petition, but a counter petition made by S. H. Mora, the promoter, which specified an error in the service of the original papers, was later presented and the first decision was reversed and Mora was made custodian of the property. The statement that Youngstown capitalists have secured control of the company and will remove it to Cleveland, O., is maintained to be without foundation.

The National Carbon Company, Cleveland, O., maker of dry cells, has purchased a tract of land 200 by 600 feet, bounded by Manley and Orton streets and Thompson and Mott avenues at Long Island City, N. Y., and will erect a factory building that will cover the entire property.

A factory building to be located at Colton, Cal., has been contracted for by the Hydraulic Truck Company of that place.

USED MOTOR WAGONS 12 YEARS.

The Joseph Horne Company, Pittsburg, Penn., which operates one of the largest department stores in that city, and has 55 machines in its service, began with its first motor vehicle more than 12 years ago and constantly increased its equipment until it was completely motorized. This concern was one of the first in the country to utilize motor wagons, and its experience has proven the economy and better service that is practical with them.

The company has provided every facility for storing and maintaining its fleet of machines, having a garage that has 15,000 feet of floor space, located in the centre of population of the Pittsburg district, which is extremely advantageous for expeditious delivery. The building is designed to provide for future requirements as far as these may be foreseen, and is constructed of steel reinforced concrete and is fireproof. The equipment is the best that experience has taught is available for care and upkeep and includes a repair shop with a full installation of hand and machine tools, blacksmith and brazing departments, a tire repair shop with a large vulcanizing outfit, a fireproof oil storage room and a 1000-gallon air-pressure gasoline storage system. In the building there is a large mezzanine floor on which are a dining room, a rest room, spacious lockers and the best of toilet accessories.

HUTCHINSON JOINS STERNBERG.

Rollin W. Hutchinson, who was advertising manager of the International Motor Company, and later was associated with the transportation engineering department of the Packard Motor Car Company, has been appointed general sales and advertising manager of the Sternberg Manufacturing Company, Milwaukee, Wis. Mr. Hutchinson is well known in the East, for a considerable length of time being a resident of New York, and he was identified with the National Motor Truck Club of that city. Mr. Hutchinson has attracted some attention recently by a broad criticism of the motor truck and wagon manufacturers for not supporting to the fullest extent the widely directed promotive endeavors of the Motor Truck Club, and has advocated the formation of a national association of motor truck manufacturers along similar lines to the Electric Vehicle Association of America, which, he maintains, would serve a very useful purpose and directly benefit the industry.

With the purchase of 10 White taxicabs the Cleveland, O., Taxicab Company now has 18 of these machines in active service. The company was organized two years ago and began business with six machines, and after about a year's experience with these ordered two more. Because of the satisfaction obtaining with the cabs and the increase of business the latest order was decided on.

ADJUSTMENT FOR DEFECTS ONLY.

Some of the Tire Manufacturers Considering Abandoning "Mileage" Basis.

While no decision has been reached as yet, some of the largest manufacturers of tires are said to be considering a proposition to abandon making adjustments on the basis of mileage, and to confine their guarantees against such defects as will reduce the serviceability of the tires, just in the same manner that most other manufacturers guarantee their products against faulty workmanship or defective material. The application of this policy is not stated, but it is assumed to be with reference to pleasure vehicle shoes, for the companies that are recognized leaders in the industry in January established a lower rate of guarantee for mileage for motor truck and wagon tires.

The claim is made by the tire manufacturers that were it not for the guarantees they would undoubtedly sell tires for lower prices, and they would willingly protect any purchaser against whatever defect might result from poor material or bad workmanship. But to say that a tire shall yield a specific mileage in any conditions is not reasonable and the supposition that a guarantee may be given leads to neglect and abuse that is extremely costly and must in the last analysis be paid for by the people who use tires.

When a tire is sold with a guarantee of mileage the purchaser naturally assumes he is entitled to all he pays for, despite the conditions for use, and demands that he be given adjustment on the basis of sale. The experience has been that facts are economized and claims made with the expectation of obtaining whatever may be due from the viewpoint of the purchaser. Business competition has impelled such adjustment as may satisfy the user, even when imposition is realized, and when there is reasonable knowledge of this.

The belief is that were the guarantee simply confined to factory imperfections that would reduce the normal wearing qualities of a tire, and the owners required to provide their own guarantee by driving with such care as would be expected with tires that were susceptible to damage, they would exercise such care or supervision as would afford them good results and at a comparatively lower price. Statement may be made that the price of rubber is advancing, but this is not as yet a factor that will influence a change in the market price of tires.

The Chr. Heurich Brewing Company, Washington, D. C., has decided to motorize its transportation department and will install as its standard equipment the Vulcan trucks, made by the Driggs-Seabury Ordnance Corporation, Sharon, Penn., giving an initial order for one each of the two, four and five-ton chassis, which will be delivered in a very short time. Additional chassis will be installed until the entire translation is made.

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WANTED—A motor truck designer of acknowledged ability and experience, for factory now fully occupied; want an aggressive man with wide range of knowledge of the motor truck industry. Box X, this office.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., MAY, 1914

No. 5

REGULAR DELIVERY IN 100-MILE RADIUS.

How Motor Truck Economy Developed the Remarkably Efficient Service, Unequalled Facilities and Splendid Equipment of the Paine Furniture Company, Boston, Mass., Operating the Largest Store of the Kind in the World.

MAKING regular delivery by motor trucks within a radius of 100 miles of its store, and in the event of purchase of sufficient volume to justify sending them 150 miles or more away, the Paine Furniture Company, Boston, Mass., is serving its customers in practically the same manner that any enterprising concern serves a community. This statement does not mean occasional delivery, but a constant service that is as dependable as is the distribution of the locality store.

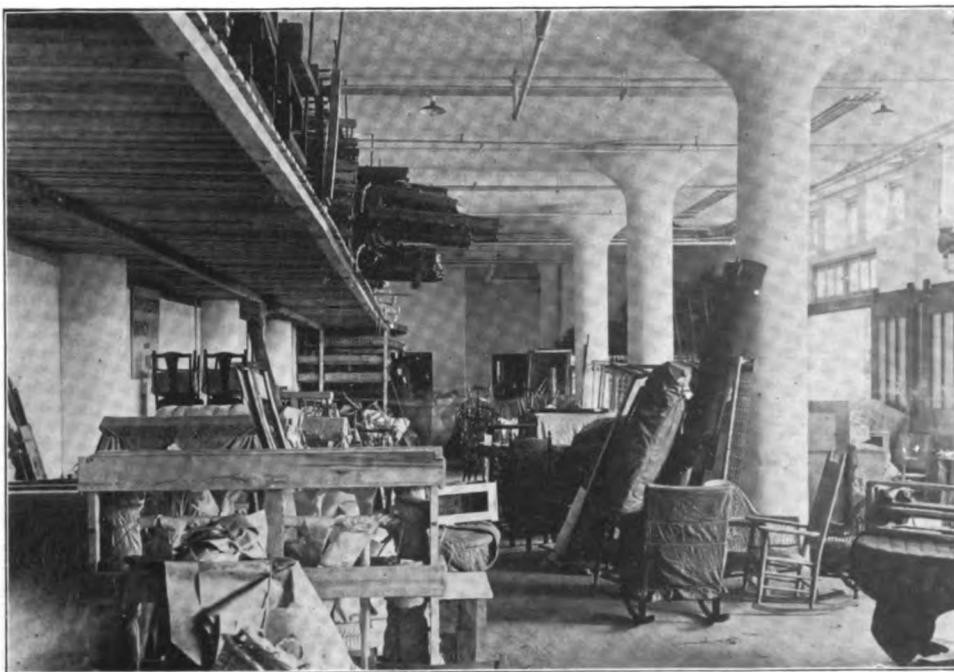
There are those who will assume that with all of the resources of highly specialized transportation companies the economy obtaining is doubtful, because of the

apparently prohibitive aspect of haulage expense, but the company has constantly increased the area in which it makes delivery and has perfected its organization until it is believed to be one of the most practical and satisfactory in the commercial world.

This statement may be regarded as broad and sweeping, but it is no more than the fact, for after long experience with motor vehicles the company has not

only practically eliminated animals, but has provided loading facilities and built a garage that will be sufficient to meet all requirements for many years. The company occupies what is claimed by it to be the largest furniture store in the world, and this was created after extremely careful analysis of business development, with every provision that experience sug-

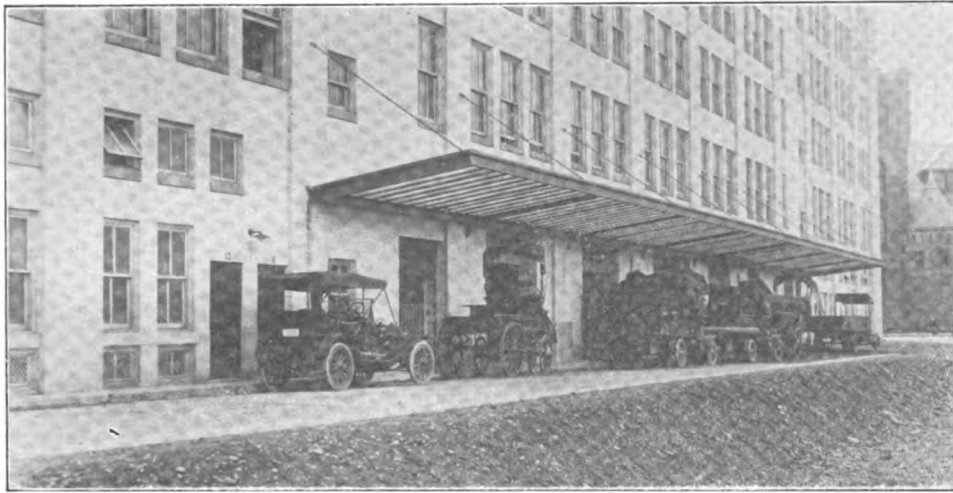
gested. The transportation department, which is known to be fundamentally the most important of all, has been perfected to a standard that will insure the largest measure of efficiency and the greatest economy. Incidentally, the delivery equipment and facilities represent relatively a



Portion of the No. 2 Shipping Room of the Paine Furniture Company, Designed to Facilitate the Quick Handling of All Goods Shipped or Delivered to Customers.

greater expenditure than any other division.

Until April the company was established in Canal street, where its salesrooms and warehouses were in three separate buildings. Two years before plans had been developed for the centralization of all departments under one roof, and this resulted in the purchase of a property fronting in Arlington street, in the Back Bay district, extending from St. James to



Part of the Drive from St. James to Stuart Streets, 25 Feet Width. Where 30 Machines Could Be Loaded Simultaneously, to Which the Company Has Exclusive Right.

Stuart streets, on which was erected a brick and stone structure. The building has length of 272 feet and width of 100 feet, 10 stories above the basement, having a floor area of 275,000 square feet exclusive of elevators, staircases, etc., or more than six acres.

This contains the salesrooms, warehouses, shops and the factories in connection with the business, and shipping departments that will be adequate for many years to come. So spacious is the building and its departments that hundreds of people can be served simultaneously without congestion or limiting the display of stock through examination. The statement as to the magnitude of the business, the facilities for transactions, and anticipation of the needs for expansion, is made to emphasize the progressiveness of the firm.

When the company removed from the old buildings to the new store the radius of regular delivery was increased from 60 to 100 miles, not with the expectation that this might influence patronage, but because the service could be developed with a satisfactory economy and the demands of customers satisfied. The company deals at retail in medium and high quality products, and specializes the construction of exclusive designs. Its business extends throughout New England. The manufactured stock is received by water or railroad shipments and hauled from the terminals by a contractor, the company believing that this work can be done cheaper by contract than by maintaining additional equipment for work that is exceedingly variable.

While in the Canal street store the facilities for handling the stock were extremely limited. Every article delivered was taken out of a single entrance and the handling and loading was done in the street,

the goods being exposed to storms and the workers hindered by pedestrian and roadway traffic. This condition caused the annual loss of a large amount. When the site for the present store was bought, despite the fact that this afforded a street frontage of 474 feet, and that the sidewalks and roadways, little used as compared with the old store, were available, the company protected itself by purchasing a strip 25 feet wide, extending from St. James to Stuart streets, having an area of nearly 7000 square feet. At the prices commanded for Back Bay property, this represented a large investment for land that was intended, from one point of view, to be unproductive, but the intention was to have exclusive control of its loading facilities, and the cost, when weighed against the possible economy, was believed to be justified.

This strip is used for two purposes. For half the length from St. James street it was excavated and connected with the basement, this being used as an excelsior room. The room is roofed with concrete that forms a paving for half the drive. Three trucks can pass through it abreast, there is abundant space for two abreast when loaded, and 25 machines can be loaded at one time.

The No. 1 shipping room is in the basement, and the No. 2 shipping room, from which deliveries are sent out, is on the first floor. This is about 125 feet in length and 35 feet width, with six large entrances and two elevators. The entrances are protected by a wide metal and glass canopy, under which all the machines may be loaded. The shipping room is divided into sections in which are placed all orders that will make single loads, and the goods can be



Line of Trucks and Wagons Loading and Ready for Freights in the Drive at the Shipping Room Entrances, Demonstrating the Value of the Facilities.

handled without confusion. The sections are designated for different local routes and the loads are assembled by the shipping room force, so that the crews of the machines can load without delay.

The company uses six Packard trucks, three of three tons and three of two tons capacity, and besides these four horses are used, either as teams or singly, for short hauls, generally within a radius of about two miles.

Sales and Shipments.

The store is opened daily at 8:30 and is closed at 6, but during July and August it is not opened Saturdays. The shipping is without reference to sales hours. When goods are sold the samples are shown and for delivery new stock is requisitioned from the warehouses, sent to the "clean-up" room, prepared for delivering and placed in the shipping room. Occasionally several days will elapse before goods are ready for loading, although a single piece might be taken from a showroom to fill an emergency order.

When goods have been made ready for delivery great care is necessary in handling, because of the possibility of damage. With motor trucks the goods are merely wrapped to prevent marring, but the loading must be done with extreme care. Once loaded the goods may be transported hundreds of miles. Unloading must be with equal care. The satisfaction of the customer is the one object sought.

With animal delivery the haulage radius is limited to approximately 10 miles for constant work, and as this is increased additional animals are necessary, but 25 miles is regarded as the limit where horses can be economically worked, although the company often sent them greater distances. But where time was not pressing the railroads and water lines were used. Considering shipments by transportation companies, these necessitate at least six handlings, extremely careful packing, and there is no responsibility assumed by the carriers. Despite the best protection that can be given the loss from damage is considerable. When sent out by trucks and handled by men of experience the goods are generally delivered undamaged, they can be set up and arranged as desired, the house cleared and left presentable. Sometimes several hours' work will be done by a truck crew, this being a great satisfaction to a customer.

Use of Motor Trucks.

While loading and unloading is not quickly done and the time of the truck and men is not productive from the viewpoint of those who believe the machine should be constantly moving, the speed and the great-

er capacity are factors of much importance, while delivery can be made to any point at a great saving of time as compared with other forms of transportation.

The first truck bought by the company was an air-cooled machine, which was placed in service more than eight years ago. This was used for suburban delivery and long hauls, and while it was not economical as compared with machines of today, because of the inexperience of the men and the crudity of construction, the experience was such that the company believed that motor trucks could be used to decided advantage for long hauls, at least. The first truck was used for more than two years and Oct. 1, 1908, No. 36 truck, a three-ton Packard, was bought. The next truck was No. 35, which was purchased in September, 1909, and since then the other four were acquired, the last machine, No. 44, of two-ton capacity, being delivered Sept. 18, 1913. As the trucks were bought the horses used for delivery were disposed of as conditions justified, until now but four remain, and the six machines do all the work of delivery within and



How Experts Load and Protect Furniture Carried by Motor Trucks, Every Piece Being Carefully Wrapped and Roped—Why Loading and Unloading Requires Time.

without the 100-mile radius, unless, should there be emergency, the company ships by freight to local agents that will receive the goods and be responsible for delivery and setting up in precisely the same manner as are the employees that accompany the trucks.

The delivery of the goods for local and distant routes is made with much care. Assuming conditions for local distribution: The goods are taken from the warehouses and cleaned and finished. They are then placed in shipping room No. 2 in the spaces designated for the localities to which they shall be sent. They are loaded for what are known as circuits. That is, the routes are made up daily according to the deliveries and the intention is to have each driver serve a group of cities or towns, delivering in them and making collection of goods that are sent back in exchange, for repair or because of dissatisfaction. These loads are usually miscellaneous. Where full loads are carried the trips are made direct. The expectation is that



The Garage of the Paine Furniture Company in Munson Street, Boston, an Admirably Designed and Equipped Structure, with Capacity of 20 Trucks.

the drivers will take with them whatever number of helpers will be needed. The loading requires time because of the care necessary, and unloading may take several hours, as setting up and arrangement is often required. The customers are not denied this service. To the contrary, it is freely given, though it means the time of the machine as well as the men.

Long Distance Delivery.

When the loads are for longer distance a different plan is followed. Definite dates are selected for delivery in any given locality and these are posted for the information of the selling department. Thus if a Worcester customer wants to know when a purchase can be delivered the salesman can give this information, and the time allowed is such that a full load for Worcester can be sent. If the volume for any given locality necessitates an additional truck it can be provided, and the two sent together. The dates chosen depend upon the patronage, but two or even three deliveries are made weekly in such cities as Providence, and once a week or oftener Springfield, which is 90 miles distant.

Deliveries have been made as far as Lenox, Mass.; Wallingford, Conn.; York Beach, Me.; the Wallingford trip being a drive of more than 300 miles for the truck. These loads will frequently reach values of more than \$5000, and occasionally considerably in excess of that figure. With the long trips the machines are loaded the afternoon before and the start is made early in the morning, that the driver may have daylight for roads not familiar to him. With the longest drives stops are made for the night and the trip continued the second day, delivery being made and the return begun by day. The third day the trip is completed. Days when big loads and long drives are in prospect

the drivers are given short routes and later they load their machines and leave them at the garage, from which the start is made the following morning. Obviously the hours of the drivers are greatly varied, but the purpose is to equalize their work so far as is possible.

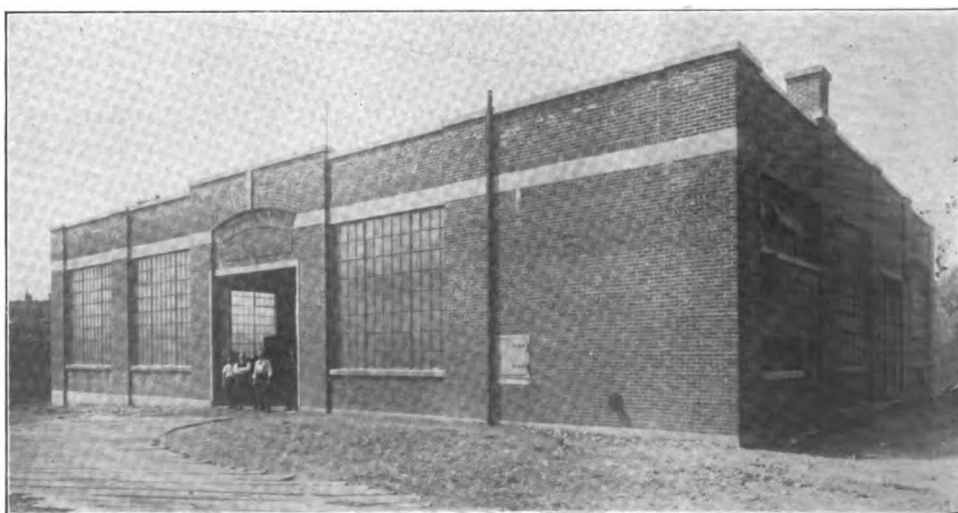
Care and Maintenance.

The drivers are developed from horse drivers, who have experience in handling furniture, and they are trained to meet the requirements of the company. Each driver is re-

sponsible for the truck and the load and the delivery of the goods, and is directly responsible to the shipper.

The trucks are kept in the garage of the company in Munson street, which is one of the finest private stations in America. The building is of brick and stone, of factory construction with a roof supported by steel trusses, and admirably lighted. The floor space, without a post, will easily store 20 trucks. The heating plant is in a basement, and over this is located a lavatory and locker room for the drivers. The repair department and the stockroom have been located, but are not yet complete, for the garage was occupied late in February and some interior fitting is yet to be done. The building is fireproof and is provided with an extinguisher system and electric light and power. There are two large entrances. In this are at present kept the pleasure cars of the president of the company and several cars owned by others, for the purpose is to store private machines so long as there is space in excess of the requirements for the company. The garage was built, however, to provide for the needs of the company for a long time to come.

The garage is in charge of a superintendent who is responsible for the condition of the machines mechanically. The plan is to have five trucks in use



Rear Section of the Interior of the Paine Garage, Showing Five of the Machines Regularly in Service Lined in Their Storage Spaces.

daily, and to have the sixth in reserve for use while any one is being adjusted or repaired or there is excess delivery. The superintendent directs all the work on the trucks, and while he is working on one the driver of the machine is his assistant. If other help is needed it is provided. In this way the drivers are trained to understand their machines mechanically, how to care for them and to protect them against abuses. The helpers are required to oil and grease the trucks, to fill the water, fuel and lubricant tanks, and the garage workers wash and clean the vehicles. The trucks leave the garage mornings in season to reach the store at 7:30, and they are generally all in by 7 in the evening, save when the long trips are made. In such work the hours are not regular. Some idea of work that can be done with the machines may be gained from the statement that directly following the holidays the company inaugurated a removal sale, and in addition to the delivery in connection with this the transfer of all the stock from the old to the new store was done by the trucks, so that the entire winter the equipment was worked to its capacity constantly.

The Matter of Economy.

The economy of the motor trucks to the company cannot be measured by comparison with animal vehicles because the machines do work that could not be accomplished with horse equipment, and results are not comparable with railroad freightage from the fact that packing, haulage at either end and damage from handling are to be added to the transportation to anything like an approximation, while the value of specialized service and attention cannot be estimated with accuracy, although it is an important factor. That the company does practically all its delivery by trucks is the best answer that can be made as to its measure of economy, and that it has established its service regularly in an area larger than most concerns serve with railroad facilities, is a sufficient indication of the results obtaining with them as against the best of modern railroad and water transportation companies.

The saving obtaining is not problematical. It has justified the creation of facilities for loading that are not equalled in America, and the construction of a garage that is sufficient for practically four times the present equipment. The investment the company has made in economizing highway haulage represents a large sum, and it has not been expended without definite knowledge of the possibilities.

The trucks are each driven from 12,000 to 15,000 miles annually and the oldest one in service is nearing the end of its sixth year, while another is well along in its fifth year. These two machines are regarded as being practically as good for the work as when they were first purchased, and in fact they are used for all the very long drives. No. 35 is the oldest Packard truck in New England, and one of the oldest in America. Basing expectation on service from the machines to date they are good for several years more, and the conclusion is inevitable that with reasonable

care and maintenance they will endure much longer than the period usually accepted for truck life. With depreciation estimated on five years the oldest truck has been completely paid for by depreciation charges earned and its service is now much cheaper, for several of the principal items of overhead have been eliminated. And the belief is that the other machines will afford equally satisfactory results.

WORLD'S TRADE OF THE UNITED STATES.

The bureau of foreign and domestic commerce of the Department of Commerce and Labor has issued a very convenient reference book for the exporter or manufacturer interested in foreign trade, entitled "Bulletin of Imports and Exports of Merchandise into and from the United States by Countries, and Principal Articles", which may be obtained from the superintendent of documents, Government Printing Office, Washington, D. C., for 15 cents a copy. The bulletin will afford to the business man instant information of the character and volume of the commerce with any foreign country, giving the quality and value of the principal purchases from the United States and the importations from that country for the years 1912 and 1913. This information was formerly included in table No. 19 of the annual report, "Commerce and Navigation of the United States", a costly and limited edition publication, but published in this form is available to practical business men at trifling cost.

WANTS WATERFRONT TERMINAL.

The Merchants' Association of New York City has appealed to Governor Glynn of that state to present to the extra session of the legislature a request that such legislation be passed as will make possible the construction of the terminal waterfront railroad proposed for Brooklyn, this to be used jointly, with equal interests in a holding company, by all railroads entering that portion of the city, and that a public hearing be held for the purpose of determining the sentiment of the business men relative to the proposition. If the railroad is constructed the belief is that it will be extremely productive of business promotion.

With liabilities of \$12,594.73 and assets of \$50,051.61, the Wambold Manufacturing Company, Milwaukee, Wis., manufacturer of brass castings, etc., has been petitioned into bankruptcy because of the inability to procure the necessary capital to meet pressing obligations.

Thomas Burneson has been appointed district manager for the Gramm Motor Truck Company, and from headquarters at York, Penn., will cover Pennsylvania and Maryland. He was formerly connected with the Kline Motor Car Company as manager of the York branch.

CENTENNIAL 'BUS MOTORIZED.

Mammoth Passenger Vehicle, in Service 40 Years, Modernized by Tractor.

The exposition that was in celebration of the centennial of the founding of the republic was the occasion for millions visiting Philadelphia, Penn., the summer of 1876, and because of the dependence on animal and railroad transportation at that time an enterprising individual conceived and constructed a passenger omnibus that was a mammoth as compared with the conventional vehicles of that time. The 'bus was several times the length of the standard vehicle and had seating capacity for 60 people, and half as many more could stand in the passage between the seats.

The 'bus was given the name "Pride of the Nation" and it was drawn by teams of 10 horses, plying between the Philadelphia City Hall and the exposition grounds. Thousands of people were transported in it during the period the exhibition was open to the public, and it was extremely productive for the owner from a financial point of view, but after the service for which it was built had ended the vehicle was sold at a sacrifice because its size prohibited its use for ordinary purposes.

It was purchased and taken to New York, where it was utilized for transporting picnic and outing parties and holiday excursionists, for its capacity of 100 persons made it extremely desirable for such occasions. For 35 years the 'bus has been used each season with reasonable profit to the owner. Despite the service it is in excellent condition and because of the possibilities through its use the owner, George Schlitz, who conducts a stable and garage, motorized it by purchasing a Knox-Martin tractor, and he is now using it with much success.

The transformation merely required the removal of the forward wheels and the attachment of the body to the turntable of the tractor, a work of trifling expense, and this done the vehicle was ready for drives

of as much as 150 miles or more a day with capacity loads. The accompanying picture shows the tractor and body with 75 persons in view on it. The proportions may be judged from the tractor and the man standing beside it. The owner is so satisfied with the 'bus as it is now equipped that he purposes sending it overland to ply between San Francisco and the Panama-Pacific Exposition, and this will probably be done at the conclusion of the present season.

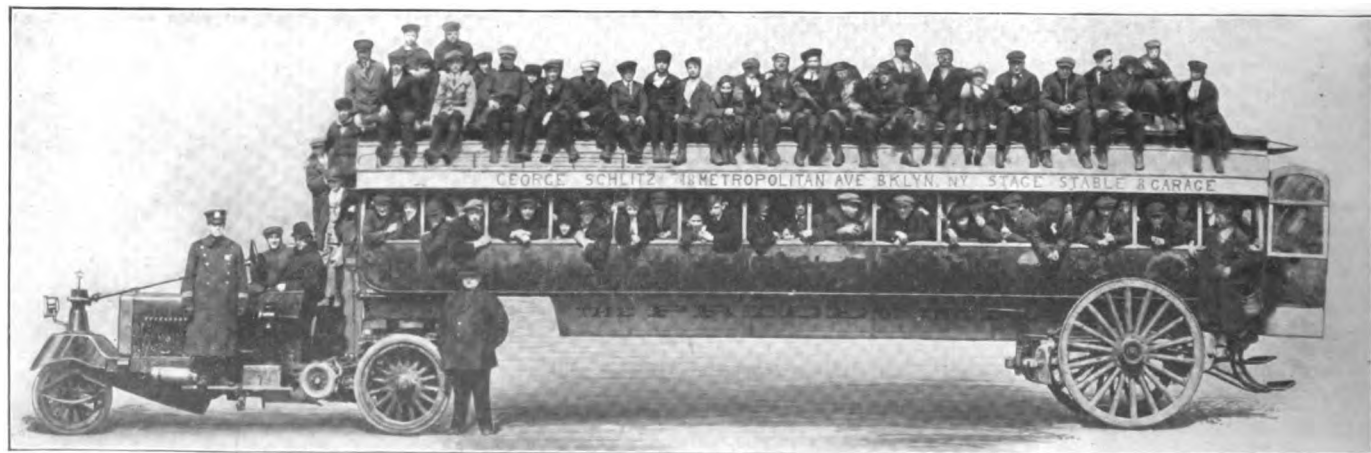
WANT MOTOR RECIPROCITY.

Wherever the boundaries of the United States and Canada are separated by a waterway, especially where there is a direct line of communication, motor vehicles are driven from the one country to the other. Registration is required of the owners where they reside, but there has thus far been no recognition of foreign regulation by either country. Agitation has been begun in Michigan and Ontario, where the interests of the people are closely related, for reciprocal courtesy, so that the machines can be driven across the boundary lines, either for pleasure or for business, and it is not improbable that this will be brought to the attention of the governments officially. Local relations might be regarded, but these would not be more than courtesies, while in the event of governmental action then well defined rights could be established.

H. E. Eaton and B. G. Ward are incorporators of the Raymond Auto Wheel Company at Portland, Me., which concern is to engage in manufacturing and selling motor vehicles, wheels, etc., with capital of \$600,000.

A building at 736-40 Woodward avenue, Detroit, Mich., has been leased and is now occupied as a branch by the Willard Storage Battery Company. The branch has 10,000 square feet of floor space.

J. William Fischer, Jr., sales manager of the Silvox Company, 60 Wall street, New York City, is secretary of the Spark Plug Manufacturers' Association.



Mammoth Omnibus, Built for Service at the Centennial Exposition, Used for 35 Years in Brooklyn, N. Y., Recently Motorized with a Knox-Martin Tractor—The Faces of 75 of the 100 People on the Vehicle Are Shown in the Illustration.

WILL MANUFACTURE BENZOL.

A plant is to be constructed at Farrell, Penn., by the United States Steel Corporation at a cost of about \$400,000 in connection with the coke ovens operated at that place, for the manufacture of benzol, and it is expected that the plant will be operating in approximately a year. The purpose is to produce benzol, which has a very satisfactory efficiency as a hydrocarbon fuel, in large quantities, and to sell it for general use in internal combustion engines of all kinds.

The company has produced benzol in small quantities and after the fuel had been tested in differing uses decision was reached that it could be manufactured wherever the coke ovens are located in sufficient quantity to warrant it being taken up as a practical commercial product. Benzol has been used to considerable extent in Europe and while the possibilities for production are limited it has much to recommend it, having greater fuel value than either alcohol or gasoline. One advantage is that it may be used with any form of carburetor constructed for use with gasoline. If the plant is a success it is not improbable that others will be built wherever the company has coke ovens. These are now located at Sharon, Penn., Gary, Ind., Joliet, Ill., and Birmingham, Ala.

RUTHERFORD PROMOTED.

W. O. Rutherford, who was for four years assistant to H. E. Raymond, second vice president and general sales manager of the B. F. Goodrich Company, Akron, O., has been made assistant general manager for the company and the scope of his duties has been considerably extended.

The address of the United States Light & Heating Company's general offices will be at Niagara Falls, N. Y., after May 20, at which date they will be established at the factory. This change will enable the company to consolidate the administration, sales, engineering and production departments.

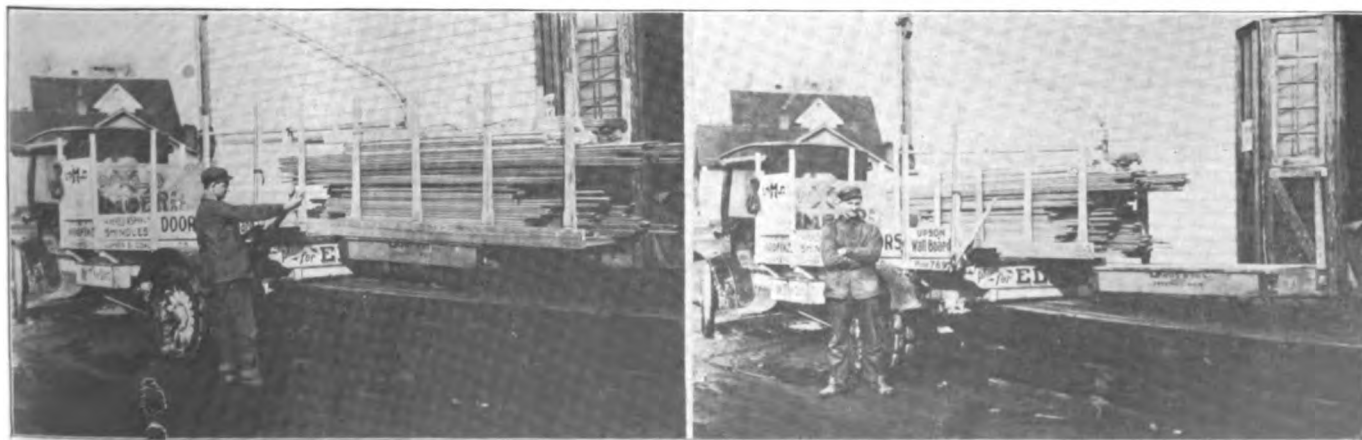
QUICK LUMBER HANDLING

Combination of Loading Crates and Platform Truck Minimizes Yard Labor.

The Hawkeye Lumber & Coal Company, Cedar Rapids, Ia., one of the largest concerns in that city, does an extensive lumber business, deliveries being made for considerable distances outside of the municipality. For years haulage was by animals and the experience with these was practically the same as those using them for highway transportation. The company purchased a two-ton B. A. Gramm's truck for use on the longer hauls, or where it could be advantageously utilized.

The purpose was to keep the machine moving as much of the time as was possible, and experience soon demonstrated that with the best yardmen working but little gain could be made in loading, while unloading was quite as slow a process, for only the driver might be available to do this work. As an experiment a number of crates were built, these consisting of a stout platform with stanchions or stakes at either side. These were placed on yard hand trucks and loaded in the yard or lumber sheds, the trucks being eventually placed on loading platforms so that the decks of the hand and motor trucks were about the same level.

The motor truck is backed to a loading platform and the hand truck moved as close to it as is practical. The platform of the crate is dropped on to a roll set slightly above the deck of the motor truck. By turning the roll with a hand crank the crate is drawn on to the motor truck, other rolls taking the load as it advances, one man in this manner moving the load quickly and without hard labor. When the load and the crate is on the motor truck it is secured with a binding chain or rope and can be carried wherever desired. At the destination the load is unbound, and by reversing the movement of the rolls the load is dropped easily to the ground. The crate is picked up at convenience or when the next load is delivered.



Handling Lumber with Loading Crates, an Equipment Used by the Hawkeye Lumber & Coal Company, Cedar Rapids, Ia.: At Left, the Loaded Load on a Hand Truck Ready for Transferring to the Machine; at Right, the Crate Transferred by One Man with Great Rapidity.

The loading of the crates is done by the yardmen without reference to the work of the machine, there being a sufficient number so that there is no need of waiting for those sent out with deliveries, and work can be planned very systematically. The company uses the crates for lumber in length, such as is shown in the accompanying illustrations, but also for shingles, sash, doors, blinds and other materials in bundles. The pictures show the truck with the load ready for it on the hand truck, and again with the load ready for haulage and the hand truck cleared for another crate and load. This method of handling has been found to be very economical of the time of the men and the machine, and the cost of equipment is not only trifling, but when once procured will serve for a long period of time.

TRUCKS FOR COTTON HAULAGE.

Haulage of cotton is extremely important in many of the southern ports, where the bales are brought to tidewater or to the terminals by rail, and thence shipped by steamer or vessel to northern coast points for transshipment to the manufacturers. The necessity of handling the cotton economically and quickly has been the occasion of considerable experimental work with motor trucks, especially in Galveston, Tex., where several GMC electric machines have been fitted with special bodies. Because the bales are bulky and handling should be minimized, considerable attention has been directed toward the construction of what will afford ample body space and quick loading and unloading. After numerous experiments, what is believed will be a satisfactory type has been produced, and several trucks with these bodies are now in use. If they are found as practical after use for a sufficient period as they are believed to be a considerable number will be similarly equipped.

TRUCK PARADE FOR MILWAUKEE.

Plans are now making for a big parade of motor wagons and trucks that has been organized by the Milwaukee, Wis., Automobile Club, the purpose being to invite all owners in that city and vicinity to make a demonstration that will create interest and impress upon the people generally the number and the utility of the machines now in service. The event will be one of the features of the observance of Memorial Day.

C. J. T. McCaffry and E. C. Reed of Washington, D. C., and C. C. Guyer of Wilmington, Del., have organized the American Auto Tractor Company with capital of \$300,000, to build motor vehicles, engines, tractors, etc.

George V. Lyons has been appointed manager of the San Francisco branch of the Moreland Motor Truck Company.

AUSTRALIAN MOTOR IMPORTS.

The value of the motor vehicles of all kinds imported into New South Wales in 1913 was \$2,789,159, which, compared with the importation of machines valued at \$2,873,696 in 1912, shows a shrinkage of \$84,537 for the year, but the value of the imports from the United States during 1913 was \$646,038, which was a gain of \$93,344 over 1912, when the value was \$552,674.

The 1913 imports were made up of \$2,205,317 for chassis, which shows a loss of \$110,597 when compared with the chassis imports for 1912, but there was a gain of \$24,225 in body valuations and of \$1835 in motorcycles, the 1913 totals for the two being \$376,238 and \$207,604 respectively. The imports from the United Kingdom totalled \$768,415 in 1913, this being \$28,297 less than in 1912, but the imports from the United States increased. France was third in the list with a total of \$233,694 for 1913, this showing a loss of \$88,458; Canada was fourth with \$214,443, a gain of \$52,481; Germany was fifth with \$144,267, a gain of \$11,559; Italy was sixth with \$139,566, a loss of \$69,241; Belgium was seventh with \$47,801, a loss of \$80,393; Switzerland was eighth with \$3844, a loss of \$1631; Sweden was ninth with \$3451, a loss of \$19,932; Netherlands was 10th with \$2142, a gain of \$1251, and Austria was 11th with \$1654, a loss of \$11,320.

GOODYEAR ABANDONS RETAIL SALES.

The sale of Goodyear tires was on April 1 placed in the hands of retail dealers throughout the country, and the products of the Goodyear Tire & Rubber Company, Akron, O., are now being distributed from the 60 different branches and service stations. This policy is expected to work out very satisfactorily, as it will not bring the company and the retailers into competition. The result will undoubtedly mean the relocation of some of the branches, which will be more of the nature of warehouses, and where practical these will be established in connection with the series of service stations that the company had opened in a considerable number of the larger cities.

CREDITORS GET BIG DIVIDEND.

A dividend of 40 per cent. has been received by the 58 creditors of the B. F. Board Motor Truck Company, Washington, D. C., which was declared bankrupt July 9, 1913, by the distribution among them of \$9463.79, and it is believed that a dividend of perhaps 30 per cent. more will be paid.

The Ferro Machine & Foundry Company, Detroit, Mich., has appointed Roland Cole, formerly connected with the Yawman & Erbe Manufacturing Company, Rochester, N. Y., its advertising manager.

ASPHALT PAVING HAULAGE.

Fleet of Nine White Trucks Bought by Brooklyn, N. Y., Construction Firm.

One of the problems of contractors for street construction, where the paving is asphalt, is to have the material in condition for application when delivered at the job, for with rare exceptions conditions do not permit or justify the establishment of a temporary plant. Asphalt as a material may be received in drums or barrels or other containers, but when applied it must be mixed with sand or gravel to give it sufficient body, for the asphalt will soften at comparatively low temperature and will be cut by the wheels of the traffic over it. To minimize repairs and attention the asphalt is prepared by heating and mixing, and this can only be done where there are facilities adequate for the work, for obviously the materials must be in quantity, the sand or gravel must be dried or heated, and the asphalt must be liquefied so that it will penetrate the sand thoroughly.

If permitted to cool the mixture cannot be worked, and when solidified it must be broken and heated, necessitating expensive work. It can only be applied to dry surfaces, and usually it is spread by rakes and then rolled to a uniform thickness. Generally the contractors prepare the mixture at a permanent plant and depend upon carrying it heated to the job. If the haul is long there is probability of cooling, and in any event it will be difficult to handle because of adhesion to the vehicle in which it is transported.

Handling asphalt in motor trucks requires a body that can be elevated to such a degree that the load can be dumped by gravity, for excessive heating will destroy the asphalt, as it will become hard and will crumble when cold. Quick handling is the solution of the work and such equipment as will make possible the elevation of the body sufficiently to a point where the load will discharge. To meet the requirements of its work the Brooklyn, N. Y., Alcatraz Asphalt Company recently purchased nine five-ton White trucks, fitted with steel bodies and a power hoist by which the highest elevation can be reached in 30 seconds. These machines are now in service in New York City and have given the fullest degree of satisfaction. This is the largest number of motor trucks operated by an asphalt construction company in America and probably is not equalled in the world. With these the operations of the company can be extended very generally and a superior quality of work done at distances.

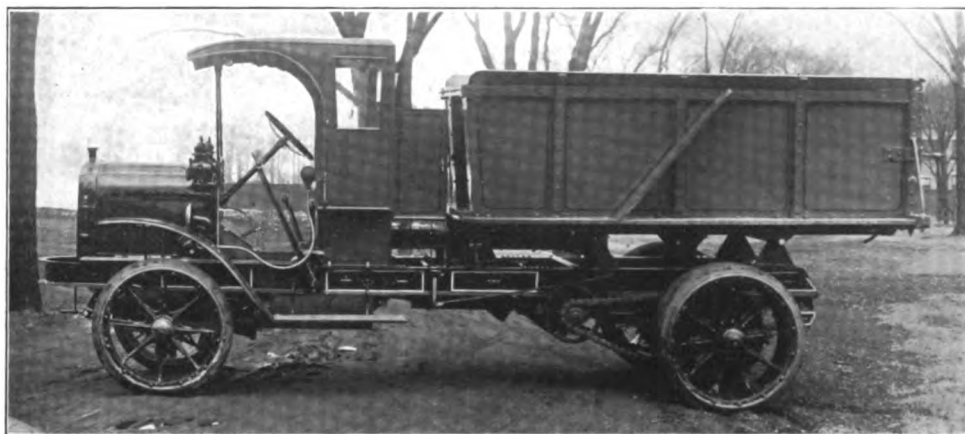
"RAISE RATES" SAYS WILLYS.

Big Motor Vehicle Manufacturer Advocates Advance Asked by Railroads.

John N. Willys, president of the Willys-Overland Company, executive of several other concerns of prominence, and second largest manufacturer of automobiles and motor trucks in the world, has declared himself squarely as favorable to the increase of railroad freight rates for which authorization is sought from the Interstate Commerce Commission, this being in striking contrast to several automobile manufacturers who have strenuously objected to any change from the present charges.

Mr. Willys did not make this declaration without careful consideration, and it was then in the form of a communication to the Interstate Commerce Commission, which was substantially as follows:

After considering from every angle the matter now before your honorable body, pertaining to the general increase in



White Five-Ton Truck Chassis Fitted with Special Power Dumping Body, One of a Fleet of Nine Purchased by the Brooklyn, N. Y., Alcatraz Asphalt Company.

rates, I am constrained to write and express to you my belief in the advisability of such action. I am convinced that conditions warrant it and that carriers are entitled to a larger revenue for the service they perform.

So I would respectfully ask to be placed on record as not only not objecting to the increase, but as strictly advocating it, notwithstanding the fact that it will mean a large increase in the expenses of my company.

I might add that the Willys-Overland company and the several companies owned by it and myself, making parts for Overland cars, are, as you are doubtless aware, heavy shippers. The Willys-Overland company alone ships and receives approximately 16,000 carloads per annum and pays freight charges on inbound carload shipments, exclusive of coal, oil and lumber, considerably over \$200,000 per annum.

J. G. Buchanan, M. H. England and A. Black are the incorporators of the Pittsburg Model Engine Company at Pittsburg, Penn., with capital of \$750,000, to manufacture and sell gasoline engines for motor vehicles.

To engage in the manufacture of carburetors, etc., the Ahlberg Kerosene Carburetor Company has been incorporated at Pittsburg, Penn., with capital of \$300,000 by M. J. Dain, H. Davis and P. W. Burke.

UNIVERSAL TRUCK ACCOUNTING SYSTEM.

Simplified Record of Work and Operating Expense and Revenue for Motor Vehicle Service Adaptable to Any House Bookkeeping and Any Equipment in Use.

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PRACTICAL accounting of transportation department expense and revenue has been advocated by thousands. The necessity of accurate determination of operating cost and earnings is admitted by all who have to do with motor vehicles—those identified with the industry, with the sale of machines, with their use and maintenance, and those who are studying the economies obtaining from their service. The value of actual data is understood, but as they can only be obtained with experience, and there are innumerable variables that have material bearing on results, only where a motorized equipment has been used for a considerable time are dependable figures obtainable.

The adoption of a system that might be productive of accurate facts is seldom seriously considered, because where a house method of accounting has been the vogue any variance from this would result in confusion or, perhaps, a complication, and simplification of accounts is absolutely essential. The business man will hesitate if accounting of a transportation department will necessitate a radical change in his office work, or will add materially to it. While he will admit the need, the system that will appeal to him will be that which will supplement what he already has in use, and he will reject that which will not coincide with it.

Not only this, business men are not agreed as to the factors that should be incorporated in a system. Believing that these are all variables, and that what might be applicable to the

TOR TRUCK has had developed a system that is intensely practical, that is equally as well adapted for the largest transportation department as for the business that uses a single vehicle, that can be adopted at any time without change of bookkeeping methods, and covers every detail with absolute accuracy.

The Universal Truck Accounting System.

This has been given the title of Universal Truck Accounting System. It has been copyrighted and application has been made for the registration of this title as a trade mark in the United States patent office, that there shall be exclusive right to this title and to the system as devised.

The system consists of a series of forms, but three of which are active. One of these is a card showing the detail of the day's work, operating expense and earnings and an accident report; all the others are contained in book form and include the record of investment, the constants of the fixed charges, the monthly record by days, the cost and service of tires, and an illustration of a method for obtaining a statement of productiveness and present value of any vehicle for any given period. These records afford every detail of estimated and actual operating expense, revenue from service, revenue from other sources, gross and net earnings, mileage driven with and without load, the weight of loads carried, tire cost, etc. From these at any time the actual value of the machine and the

DETAIL RECORD OF VEHICLE SHOWING CHARACTER AND VALUE OF INVESTMENT.

Office Truck No.	Make	Motor Number	Capacity	Weight	Date Purchased	Date Delivered	Chassis Cost	Body Cost	Accessory Cost	Total Cost	TIRE EQUIPMENT	
											Front	Rear

This Form is the First of Three Printed on the Second Cover of the Daily Record Book and is to Be Filled When the System is Inaugurated—Size of Form, 13.5 Inches Width and 1.25 Inches Depth.

one business might not yield satisfactory results with another, they are inclined to doubt the practicability of adopting them. Besides, varying uses afford differing aspects, and what might be with one a factor of importance may be of little or no consequence with another.

Audit Only Guide Series of Accurate Constants.

The real determination of operating cost of a business can only logically be obtained by an audit of the books, and an analysis of facts and conditions, which may be assumed as unnecessary or undesirable from the fact that auditing would only yield a series of constants with which comparison of future expense might be made to determine possibilities for economies.

Records as proposed or suggested have appeared to be too detailed, or apparently required too much clerical work without sufficient return for the additional labor and expense, or they have obviously been insufficient. Those having but one or several machines believed that reasonably accurate figures were obtainable from the records kept, and those with considerable numbers, seeking dependable information, found even complicated systems unproductive of satisfactory data.

Confusion of Factors for Accounting.

The MOTOR TRUCK'S writers investigating highway transportation have found that with rare exceptions records kept are either insufficient or incomplete, that they seldom if ever include all factors of importance, that there is decided confusion of the factors generally used, and surprising variance of opinion relative to methods.

To supply a need that exists with a majority of those using motor vehicles, to make possible the accurate accounting of expense and revenue from power wagon equipment, the MO-

value of its service, its earnings, the profit or loss, and every item of expense of operation or revenue can be determined for any given period, as well as the average for the week, month or year.

Simplicity and Accuracy Are Features.

The system has been worked out with a view of providing for every detail, and of being extremely simple. Extreme care has been taken to insure accuracy. Complications have been avoided, and yet the records are so comprehensive that there is at all times check against any particular entry, and there is no possibility of an error. There is no reason to refer to other records, such as ledger accounts, in which will be carried some of the charges, but these will be general rather than specific and will include totals rather than items.

The scope of this system will be outlined and the specific uses of the record described in detail. First the use will be applied to a new vehicle, and following this will be given an example of utilizing it with a machine that has been in service for a period.

Operating Detail Fully Recorded.

The purpose is to have an absolutely definite record of every use made of the vehicle, and to credit it with every mile it is driven, with every weight carried, with whatever service is performed, and the time that it is on the road. It is credited with every earning, and against it is charged all costs, fixed and variable, with provision for determining the value of the variables whenever this is necessary. For the purpose of convenience the daily record is made in card form, but each day's record is transferred by totals into a book containing 12 sheets, each of which is a monthly record when footed. From this the daily averages are computed. Beginning with a new machine the constants are entered on a form on the inner

CONSTANTS OF THE FIXED CHARGES SHOWN BY ANNUAL AND DAILY COST.

	INSURANCE				TRUCK DEPRECIATION		STORAGE		INTEREST		TAXES		Est. Daily Operating Cost	Tire Operation Mileage Cost
	Fire	Liability	Property	Total	Annual Cost	Daily Cost	Monthly Cost	Daily Cost	Annual Cost	Daily Cost	Annual Cost	Daily Cost		
Date Effect														
Date Expires														
Cost														
Daily Cost														

This is the Second Form Printed on the Second Cover of the Daily Record Book and is Filled When the Accounting is Begun—Size of Form, 14.75 Inches Width and 1.625 Inches Depth.

cover, and with a statement of fact concerning the machine. At the same time on the tire record is entered the detail of the tire equipment, and to this is added whatever may be necessary as renewals or changes are made. Thus the first entries are made on the cover of the book, which is an office record, and on the tire card.

Fixed Charges Carefully Apportioned.

The data, so far as the fixed charges are concerned, are averaged on a basis of a given number of working days annually, the cost being shown by the day and by the year, save for the item of storage, which is expressed as monthly and daily cost. Thus interest, taxes and insurance are stated in annual totals, divided by the number of working days, and the garaging by the monthly charge, divided into a definite daily expense. The item of depreciation is not shown as an expense. Depreciation is based on an estimated period of service of the machine and the cost is divided into annual divisions of 12 months, so that the annual depreciation is averaged to be a specific amount daily.

Valuation of Work Done by Machines.

Whatever the work done, this must be based on the operating cost of the machine, which is estimated as a reasonable amount. Then, if the truck is used for route delivery, for instance, a value must be placed on the truck's service. By this is meant that as there is no payment made by customers for its work it cannot be credited with a precise revenue, but to do this work would cost a certain amount, and the truck's work is worth the amount this work would cost by other vehicles giving similar satisfaction. To illustrate, if the machine is doing delivery that would cost by contract or other vehicles a given sum, the value can be set at that figure.

The reason for valuing the truck's service is that, unless it can do work that has value, it is a poor investment. It must do a given work to be a good investment and that work is measured by dollars and cents. The cost of doing the work is estimated. This is stated as a basis for comparison. The expectation is that the work can be done for less than the estimated price and the purpose of accounting is to minimize the cost. If the vehicle can do more work its value is increased, and this must be represented by additional value in route work. The service that is paid for will show revenue, against which is charged the expense of operation.

In the event that the machine has been used for a period the constants are entered as with a new vehicle, but the depreciation is based on the lessened depreciation period.

Daily Report Card Shows Complete Record.

The daily record is a card 16 by 13.75 inches, perforated so that when folded it is 13.75 inches length and eight inches width. This is printed in black on a flexible manila stock and is carried in a substantial cover that fully protects it. The left half of this card is defined as the Motor Truck Daily Report. The right half is the Motor Truck Daily Operating Cost. One card is given each day to a driver and on this on the left side is entered the date, the owner's number or designation of the vehicle. These entries and the Office Instructions to Driver are filled in the office so far as this is possible. The remaining entries of the driver's instruction blanks are filled by the driver.

Reading from the top of the card the first entry is the condition of the machine, which is noted previous to the start. The weather conditions are similarly noted at the time of leaving, and under the heading of Drivers' Working Time the time of leaving the garage is entered, as well as the driver's name. The

DAILY RECORD OF THE WORK DONE, THE OPERATING EXPENSE AND REVENUE.

MOTOR TRUCK DAILY REPORT											
Date		191		Machine No.							
Condition of Machine											
At Start											
When Garaged											
Weather Conditions											
At Start		Storm Began		Storm Ended		Road Conditions					
Speedometer Readings: Start		Finish		Total Mileage							
Accidents: Time		Personal		Property		Machine					
OFFICE INSTRUCTIONS TO DRIVER											
Regular Route		Trip		Rented to		Job No.					
Customer		Report to		Address							
Time		Destination		Deliver to		Address					
Time Delivered		Received by		Time Returned		Trip Mileage					
Miles Loaded		Miles Light		Price		Collect		Charge			
Time Delayed		Cause		Driving Time							
Load: Pgs.		Bales		Bbls.		Cases		Mis.		Known Wt. Est. Wt.	
OFFICE INSTRUCTIONS TO DRIVER											
Regular Route		Trip		Rented to		Job No.					
Customer		Report to		Address							
Time		Destination		Deliver to		Address					
Time Delivered		Received by		Time Returned		Trip Mileage					
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OFFICE INSTRUCTIONS TO DRIVER											
Regular Route		Trip		Rented to		Job No.					
Customer		Report to		Address							

[illegible]

This Form Is on Sheets 23 Inches Width and 12 Inches Length, 12 Being Bound with Two Tire Records, the Book Containing Complete Details of a Machine for One Year When All Entries Have Been Filled—The Sheets Are Bound with Stout Manila Card and Are Well Protected.

speedometer reading before the start is taken by the driver.

The driver then follows the instructions noted in the blanks, four separate entries being provided on each card. If the work is on a regular route the number or designation of the work is indicated. If the machine is to make a trip, if it is rented, or if it is a job, the work is shown, the job being entered by number or title. Then follows in sequence the name of the customer, the name of the individual to whom the driver shall report, the address of the person, the time to report, and the destination, if this shall be known; the name and the address to whom delivery shall be made may be supplied after reporting, but the time of delivery and by whom the delivery was received are entered at the destination.

On the return the driver enters the time and the mileage of the trip, the number of miles driven loaded, the number of miles driven unloaded, the time delayed, the cause of delay, the actual driving time. When the load was placed on the machine the driver enters the number of packages (if a route or a special distribution of small units), bales, barrels, cases or miscellaneous, the last mentioned classification showing the character of a bulk load as of furniture, lumber, or any similar freight that cannot be better specified, with the estimated or known weight of the load. If the office desires to have the driver collect the payment for the work the amount is entered and he is instructed to make collection. If the work is charged this is also indicated. In the instruction is every detail that might be useful in making a price for a work that was unknown to the office aside from receiving an order for a machine to do a service. In the event of trips of comparatively short length the blank will provide for four, and should there be route work the driver can be given specific instruction with reference to four deliveries on one or as many different routes.

During the day the driver is required to note the time storms begin and cease and the general road conditions, at least so far as these would affect his work, there being space for recording several. For instance, following the notation "Storm Began" entries of 10:15 and 4:21, and an entry of 12:55 following the notation "Storm Ceased", would indicate that the storm of the morning continued from 10:15 to 12:55, and a second storm began later in the afternoon, the driver entering rain or snow as necessary, and with whatever will show the driving conditions. The speedometer reading at the end of the day is noted, as well as the total, with the total number of miles driven loaded and miles driven light, the time of returning to the garage, the total hours the machine was out, the total hours worked and the number of hours of overtime. Before the driver leaves the garage he enters the condition of the machine—if repairs or attention are necessary, these are

Record of Repairs and Accidents.

In the event of adjustments or repairs being made on the machine, these are specified in detail and the name of the person authorizing the work is stated. If the work ordered by the owner or driver is completed this is noted, and if not completed the reason is stated. When inspection of a machine is ordered and work is found necessary the requirements are stated on the card.

Should there be an accident the driver is required to note the time and to specify whether personal injury or damage to property or to the machine has resulted. On the reverse of the card is an accident report, in which is entered the date, the time, place, the damage to the vehicle, damage to the load, the name and address of the owner of the load, with a blank for entering the cost of adjusting the load damage; the name of a person injured with address, and the names and addresses of three witnesses. The exact detail of the accident must necessarily be made in the form of a report to the insurance companies. In connection with this report is a blank for entering the items of machine repair, specifying mechanical work, painting and tires, directly resultant from the accident.

The Daily Record in Daily, Monthly and Annual Form.

The book record consists of 12 sheets bound in a substantial cover. This is to contain the summary from the Drivers' and the Daily Operating Cost card, each line showing the complete totals for the day. First is entered the name of the driver, and then in sequence the amount of the wage of the driver, the wages of the helpers, the cost for gasoline, electric current, oil, grease and miscellaneous expenses; the cost of repairs resulting from regular service and from accident; the items for daily overhead expense, including interest, taxes, insurance and storage; the total daily mileage and the miles driven loaded and light; the record of each tire, showing the number, the mileage and the repair cost, with provision for two changes, and the cost and repair of tubes; the total operating cost and the total earnings. At the expiration of the month the sheet is totalled. Assuming an instance: From a previous sheet a total for say three months is brought forward, and the figures for the month and the three months totalled, this sheet then giving the figures for each day of the month and the total for the four months. The daily average for the month is entered under each footing, under this the daily average for the three months, and then the daily average for the four months. This can be applied for any number of months, from two to 12, and will give absolutely accurate figures, so that it is possible to make comparison at the end of any period to ascertain precise results, with reference to any desired detail. It is also practical to compare days or weeks or any term that may be necessary.

Constants Used in Operating Record.

On the inside of the first cover are two forms to be filled with record data and the constants to be used in filling daily work and cost card. The first includes the office number of the machine, the make, the motor number, the capacity, the weight, the date bought, the date delivered, the chassis cost, the body cost, the accessory cost, the total cost, and the size and cost of the tire equipment. The second is for entering the fixed charges. The insurance is differentiated as fire, liability and property; the date each policy is effective, the dates of expiration, the annual and the daily cost of each form of policy is specified, and the total of the annual and daily cost is shown. Under depreciation is indicated the annual charge and the daily cost, the former being on a basis of a definite life of the machine, and the latter on the annual charge divided by the estimated number of working days. The charge for storage is given by the month and the day, because of the possibility of a change in conditions during a year. The interest and taxes are entered as the annual costs and daily costs, each total expenditure being divided by the number of working days. The estimate of the daily operating cost is stated, this being comparable with the actual figures shown on the sheets.

The Complete Record of Tire Cost and Service.

With each book, which is designed for the records of a single machine for a year, are two tire record sheets, each having space for 30 different entries. These are carried across the page, and are in sequence for the tire number, the type, the make, the size, the maker's number, the cost, the date bought, the date put on, the date taken off, the mileage driven, the mileage guarantee, the mileage less or in excess of the guarantee, the cost of repairs, the salvage, the adjustment obtained, the estimated cost a mile (based on guarantee), the actual cost a mile, the loss and gain (the difference between guaranteed mileage cost and the actual cost), and the amount to be charged or credited to or against the truck at the expiration of the service of the tire.

Formula for Finding Operating Cost and Earnings.

On the inside front cover is shown a method of determining at any time the value of the machine, its operating cost and earnings, by the record contained in the book. The original cost of the chassis is debited, and against this is charged the amount of depreciation, ascertained by multiplying the daily charge by the number of days worked. As this depreciation has been earned by the truck the actual cost is the chassis price less the depreciation earned. Thus, if the chassis cost was \$3000 and the depreciation earned was \$600, the net cost would be \$2400. This depreciation may be credited to a depreciation account or turned into the general revenue of the owner. In any event it is credited against the chassis cost, and as this depreciation has been earned it is either avail-

able as a special fund which accumulates until it equals the price of the machine, or it is turned into general earnings, from which eventually replacement shall be made. Depreciation as found will make possible a statement showing the cost to a day for the owner's service. But depreciation must not be confounded with an estimated market value, for while a machine might be worth its full cost to the owner for a stated work, it might not sell for a half that amount when offered in the market. However, should there be a desire to determine the shrinkage of the value, this can be ascertained in the instance illustrated, by deducting the market price estimated from the actual cost, which was really \$2400 instead of \$3000. As a matter of fact, if the machine be well maintained, the shrinkage will be comparatively small. If it should be badly damaged, as by an accident, the shrinkage would be relatively much larger. Such loss could not be regarded as normal depreciation, and could not be anticipated. If the truck has been used rationally and is in good condition it may be worth the full cost to the owner, or as much as a new machine for his purpose.

Tire Depreciation Not Included with Chassis.

As the tire cost is kept separate from the chassis and each renewal means full restoration, depreciation is not figured on them. Taking the market price of the tires and the service guarantee as two factors the cost a mile can be accurately learned. The unused mileage must be regarded as worth the value guaranteed. Then the value of the chassis and the remainder of the guarantee gives the valuation of the machine and the tires. The difference between the total revenue from operation and the total operating cost gives the net earnings. Shrinkage in chassis value, a real operating charge,

METHOD FOR FINDING TRUCK VALUE AND EARNINGS.

STATEMENT OF TRUCK OPERATING COSTS AND EARNINGS.			
Total Operating Cost	\$2500	Total Revenue	\$3000
Net Earnings	500		
	\$500		
STATEMENT OF PRESENT VALUE OF TRUCK.			
Investment - Less Tires	\$3000	Depreciation Earned	\$ 600
		Actual Cost of Truck	2400
			\$3000
STATEMENT OF TIRE COST AND PRESENT VALUE.			
RF 36-5 S Guarantee 5000	\$ 100	1850 Miles at 2c	\$ 37
LF 36-5 S Guarantee 5000	100	1600 Miles at 2c	20
RR 36-4 D Guarantee 5000	200	1500 Miles at 4c	60
LR 36-4 D Guarantee 5000	200	3000 Miles at 4c	120
	\$ 600		\$ 237
		Guarantee, unearned value	363
ESTIMATED VALUE OF TRUCK (MARKET PRICE).			
Chassis	\$2000	Chassis Cost	\$2400
Tires	363	Tire Cost	600
	\$2363		\$3000
Shrinkage on Truck	637		
	\$3000		
PROFIT OR LOSS ON TRUCK INVESTMENT.			
Shrinkage on Truck	\$ 637	Net Earnings	\$2500
Profit by Truck Use	1863		
	\$2500		

The Above Form Is Printed on the Second Cover of the Book and as Filled It Shows the Factors and Method of Reaching a Precise Statement Whenever Desired.

can be included in the cost of operation, and the net earnings correspondingly reduced, but shrinkage is a factor that can only be determined by the owner's judgment.

The explanation of this system has required much space because so many details have been provided for, but examination of the forms will show that its simplicity is remarkable, and that every fact of value is accurately kept. Nothing is approximated, nothing is uncertain, and at any time a satisfactory balance of the account of a given machine can be found.

NEW M. A. M. MEMBERS.

The membership of the Motor & Accessory Manufacturers has been increased by the admission of the following firms: English & Mersick Company, New Haven, Conn.; Van Sicklen Company, Aurora, Ill.; Forbes Varnish Company, Cleveland, O.; Detroit Pressed Steel Company, Detroit, Mich.; A. O. Smith Company, Milwaukee, Wis.; T. P. Powers, Newark, N. J.; Perfection Spring Company, Cleveland, O., and Pittsburg Steel Products Company, Pittsburg, Penn.

HIGHWAY HAULAGE CONGESTS RAILROADS.

Splendid Organizations Made Inefficient by Absence of System Outside of Terminals---Consolidation of Transportation Interests and Co-Operation the Remedy.

THE conclusion that a great deal, if not all, of the congestion at railroad and general shipping terminals was due to the present inefficient and extremely expensive methods of highway freight transportation, and that improvement could be made by method and organization of those who now perform service without regard to system, may be stated as a summary of the address made by Fred A. Hortter, car accountant of the Boston & Maine railroad system, made before the Electric Vehicle Association of America at its meeting in New York City April 24.

This may be regarded as the first carefully studied statement coming from a man identified with a railroad of large proportions, and Mr. Hortter's particular duties have made necessary constant observation of conditions with reference to receiving and delivering freight at terminals. The railroads have organizations created to perform specific work and each co-operates with the other. The results depend entirely upon system. In contrast with this the haulage of the freight to and from the terminals is governed by the conditions obtaining with the contractors or the consignees, the work being done without anything else than convenience being considered.

In other words, the railroads have organizations, trained men and constant supervision. The public carries the freight to and from the stations, without organization. Were the railroads and the public to co-operate there would be material improvement. As it is the efficiency of the railroads is lessened by the absence of co-operation. The inference from Mr. Hortter's paper is that the improvement of conditions, so far as the freight houses are concerned, must necessarily come from without, and as these are improved the service for the public will be materially bettered.

Mr. Hortter did not go into detail as to how remedies might be made, but he made himself perfectly clear that consolidation of highway freight transportation service would lead to material betterment, and undoubtedly large economy, and would facilitate delivery to a degree little realized. The address follows:

Mr. Hortter's Address.

The latest available Interstate Commerce Commission report on railroad freight service, covering the year ending June 30, 1911, showed a freight equipment of slightly over 2,195,000 cars, and a freight movement of nearly 254,000,000,000 ton-miles. That the growth of this vast business has been as rapid as the development of the country is evident to everyone here, and, while many of you gentlemen are not directly connected with railroading nor familiar with its practices, you can readily imagine the problems involved in the efficient administration of this vast enterprise.

Although the major problem with which we are to deal tonight and upon which this paper directly bears, is that of terminal freight congestion, it is pertinent that a resume of the methods employed in this freight movement be here introduced as indicative of the effort and study devoted by the railroads to the economical conduct of their business, and of the

manner of solution of the problems, which in themselves are distinctly those of operation and directly connected with the railroad properties.

In considering the methods under which the railroad freight transportation of the country is accomplished we will disregard that portion which is not handled directly through freight terminals such for instance, as is loaded and unloaded at private sidings.

Classification of Freight.

For the purpose of general classification, freight may be divided into two principal classes, designated as "Carload" or "C. L." freight, and "Less-than-carload" or "L. C. L." freight. As a rule, the terminal rate for the delivery of merchandise implies the delivery to the consignee at the local freight yard terminating the trunk line on which the tonnage enters, from which point the goods are teamed to the premises of the consignee. It is customary for the shippers and consignees to handle carload freight directly into and from the freight cars, and to handle less-than-carload freight through the freight houses, unless other methods are specifically requested by consignee. The loading of freight cars to their full capacity is constantly made the subject of supervision by the railroads, with the inevitable consequence that the average tons of freight handled per car have steadily increased.

Every effort is made to assemble L. C. L. freight for one destination in one car, or if this is inadvisable because of the small volume, freight for several stations near together is loaded into one car, thus permitting a through haul on the road and eliminating unnecessary handling of cars or freight, the loading being systematized so that the car may reach its farthest point in the direction of its final destination before contents are handled.

In the same manner the carload minima have been regulated as far as possible so as to provide for utilizing the utmost carrying capacity of the car, in the case of full carload shipments which are loaded by shipper and unloaded by consignee.

Handling by Railroads.

When cars are loaded and ready to move, they are assembled in trains on classification tracks. In order to group as many cars as possible going in the same direction to or via a common point. This eliminates switching in transit with its attendant delays. As study and experience, or variation in operating conditions indicate a necessity for a change in the methods, corresponding modifications or amendments are made, always with the view of efficiency of operation.

The operating superintendents and the forces reporting to them are daily confronted with constant changes in the volume of freight to be moved and the necessity for the utmost economy and efficiency in handling it. The transportation department of a railroad is therefore continually compelled to study these changing conditions, and through supervision by the superintendents and their subordinates, any lack of economy or want of efficiency is quickly discovered and defects rectified.

As a slight indication of what this means, it may be of interest to outline briefly the amount of freight that is handled by only one railroad in one city, this road operating approximately 50 inward and 50 outward freight trains each day. During the week of Oct. 16, 1913, this road handled through its freight houses and team tracks a total of nearly 110,000 tons of freight, being divided approximately into 60,000 tons inward and 50,000 tons outward. Were it possible to team this freight at what you electrical gentlemen term a "high load factor", its movement would be greatly simplified; but observations show the "peaks" of this service to occur in the early morning and late afternoon hours, so that in from six to seven hours of the working day less than 35 per cent. of the total yard traffic movement occurs. The elimination of these "peaks" is one of the problems of the railroad terminal question.

Demurrage and Its Charges.

Another problem of freight terminal operation, with which the railroads are confronted is the continuance of a practice of 25 years ago, where shippers and consignees use the railroad premises for storage purposes. The extent of this abuse of railroad facilities led to the formation of car service and car storage associations, sometimes designated as car demurrage bureaus. Under the operation of these bureaus consignees and shippers were penalized for using the railroad facilities for this purpose beyond a certain designated free time. These associations grew up in various parts of the country until practically the entire territory was covered. The railroads delegated to them the handling of these demurrage charges or penalties, thereby eliminating any question as to favoritism in assessing demurrage and storage charges that would result from competitive conditions. The free time varied from 24 to 240 hours, according to the purpose for which the free time had been allowed and the conditions under which freight was detained.

It had always been evident that considerable advantage would result to all the business interests of the country as well

as to the railroads, if uniform car detention rules could be adopted everywhere. Consequently, in 1908, a committee of the National Association of Railroad Commissioners, in conjunction with a committee of the Interstate Commerce Commission, made a thorough investigation of this subject of car demurrage, and recommended a set of rules which were adopted by the association and indorsed by the Interstate Commerce Commission. These rules, known as the national code of demurrage rules, have since been almost universally adopted by the different states.

The advantages of uniform car demurrage rules made it very evident to the American Railway Association that uniform freight house storage rules should, if possible, be adopted, and during the last few years a standard code of freight car storage rules has been formulated and recommended for adoption by the American Railway Association.

Of course the purpose of these charges is to force the removal of freight by penalizing those who leave it for an unreasonable time on the railroad premises. Logically the demurrage should be high enough to insure this result without undue burden to any who may happen, by reasonable exercise of unloading facilities, to be unable to remove the freight within the free time. To accomplish this the free time allowance in one section of the country varies considerably from that of another, depending upon the nature of the freight and of the facilities for handling.

Study of Short Haul Methods.

All of the foregoing is indicative of the serious attention and study which have been given to the improvement of conditions involved in the so-called "long haul" of freight from city to city; but it is only recently that the necessity for giving an equal amount of study to the so-called "short haul", or teaming of freight from terminals, has been impressed upon the transportation interests.

Investigation has resulted simply in emphasizing the defects of the systems employed, but whatever remedies have been suggested have mostly emanated from and been put into practice by the railroads themselves. These improvements have generally been to little purpose through the lack of co-operation between the carrier and the public, and the inability of the railroads to control the operations of the teamsters and truck men.

This brings us directly to the main cause of railroad freight terminal congestion, namely, the present methods of highway freight transportation. The practices in vogue in this service have not radically changed during the last generation, while the conditions of operation have continually grown more complex through the increase in volume of freight handled.

From my office window I look out upon one of the principal avenues leading from the business district of Boston to the freight yards of the Boston & Maine railroad. From my observation of the traffic on this highway, it has been evident to me for many years that the movement of freight through our city streets has been conducted with very little effort to systematize the handling of the different lots of freight in an efficient and economical manner.

Lack of Efficiency Apparent.

To substantiate this let me cite one or two instances which have come to my notice which also show with what the railroad must contend in its effort to comply with the demand for efficient service. Observation of the terminal yard teaming in the Boston & Maine railroad yards in Boston showed that in one day 10,264 horse drawn vehicles handled freight to the out-bound freight houses. The total outward tonnage for the week amounted to but 22,416 tons, which showed an average horse vehicle load of only .36 of a ton each. Calculate for yourselves the efficiency of a five-ton unit operating under this load factor.

In another observation in a trucking concern hauling approximately 180,000 tons of merchandise annually, the ratio of loaded and empty mileage of the horse vehicles was found to be 241:143, while the actual moving time represented but 22.95 per cent. of the total day's work.

Of course these figures show the actual conditions studied in one city during but a comparatively short period. Nevertheless they indicate a lack of efficiency which is alarming when we consider the public has to pay the bills, and if you will take the trouble to contemplate with a discerning eye the methods of operation in any of our large cities, I am satisfied that you will be convinced of the manifest need of application of additional supervision, and intelligent regulation of the trucking business along the lines in which the railroads have worked at their handling of freight.

Car Detention Increasing.

It is not fair to the railroads or the public that the high grade of efficiency attained in one division of freight transportation should be handicapped by failure to improve the street transportation that occurs at each end of the railroad transportation, thereby causing an unnecessary increase to the consumer in the cost of the commodities transported. Were you as teamsters and shippers alone concerned, that would be another matter; but you must remember that from the time a freight car is placed in the freight terminal yard for unloading the railroad is at the mercy of the consignee, so far as that particular piece of equipment is concerned. The load may be such as could be readily removed in a few hours' time. Nevertheless, either through inadequate facilities for handling or because the time is not particularly convenient, or possibly because the consignee considers the full free time allowance as his inalienable right as prescribed by the national code of rules, this full free time—and in many cases more—is consumed in unloading. In saying "in many cases more", I speak conservatively, for, (to quote again from the I. C. C. report,)

\$9,379,524 of the gross income of the railroads of the country in 1911 consisted of penalties received for the detention of freight beyond the free time limit. Do not misconstrue this as being a desirable source of income to the railroad, because such is not the case. Every dollar collected for demurrage carries with it a loss of \$2.35 in the earning capacity of the cars held beyond the free time limit. Calculated on the basis of the demurrage receipts for the year ending June 30, 1911, the loss to the railroads in the earning capacity of their freight equipment amounted to more than \$10,482,700 above all revenues from demurrage.

The most serious aspect of the whole situation is the fact that the average car detention is constantly increasing. This is evidenced by the reports for New England for the years 1911, 1912 and 1913, which show an average car detention for these years of 1.58 days per car, 1.63 days per car, and 1.66 days per car respectively.

Effect on Terminal Facilities.

During all of this period the national code of demurrage rules was in effect. To be sure the increase is very slight, being but .08 of a day per car, but it assumes considerable proportion when based upon the 3,000,000 cars included in the figures from which this average was compiled. Expressed concretely, it amounts in the aggregate to 240,000 car-days; or, expressed in terms of cars, the railroads of New England have been called upon to increase their equipment by 800 cars within three years at a cost of nearly \$1,000,000 merely because of the inefficient system under which the freight is handled beyond the railroad's terminals.

If we pursue this line of thought a little further, we find that this increased freight car detention time not only makes a proportionate decrease in railroad working equipment, but seriously affects terminal yard facilities, the expansion of which is definitely limited by city real estate values and the conditions of the surrounding properties, inasmuch as the railroads are surrounded by industries that have secured available sites along the line of the carriers in order to be easily accessible to transportation facilities.

Railroads Seek Co-Operation.

In this quandary the railroads must seek the co-operation of the business world in order that they may work out the problem of securing the best transportation possible from the shipper to the consignee not only by the railroad but by street.

They have as far as possible increased their efficiency and reduced their costs of moving and handling freight to its destination and they have a right to expect that equal efficiency will be shown by the consignees on their part, but they find that while the railroad has spent enormous amounts of money and applied diligent study in its efforts to perfect this handling of freight, teaming through the streets has not progressed materially during the period in which the railroads have practically revolutionized the entire freight handling system.

The aim of management of manufacturing enterprises is always to effect the greatest economy in the cost of production that is consistent with the standard of quality and price of the manufactured product demanded by the consumer.

It has been evident in past years that a multitude of small railroads not operated as a system cannot produce the quality of transportation that is demanded in this great country in which we live. The result has been to amalgamate these small lines into powerful systems of railroads under one management and as a result we have the splendid system of transportation in the United States with which you all are familiar. However, when we consider the trucking industry in our various cities, we find a multitude of teaming concerns that are operating independently without any attempt of co-operation or a consolidation along the lines of greater economy or increased efficiency.

Scientific Study Essential.

It is commonly said that in our large cities the teamsters are not making any money, but are securing a bare existence in their particular field of industry. When we consider the lost motion and waste which characterizes the effort of these innumerable teamsters to handle their traffic without co-operation with others similarly engaged, it is not surprising that they are not growing rich. These various trucking concerns perform under contract about 60 per cent. of the street haulage of freight in our larger cities. Most of the business houses prefer to hire this service because they themselves have been unable to solve the problem of handling it for themselves largely because of failure to apply scientific study to its intricate propositions.

For years you gentlemen of the motor vehicle industry have been endeavoring to introduce modern machinery to replace the horse in this service and thereby produce a better quality of street transportation. You have not gone far enough. You have not endeavored to change the method. You have merely tried to improve the tools and so far you have done well; but improvement in the means without change in methods will go but a little way in the ultimate solving of the terminal freight problems. True, some slight advantage may be obtained, but so long as the efficiency of the apparatus is limited by the system under which it operates, the problem is no nearer solution than it ever was.

The Remedy Suggested.

The remedy is apparent. It lies in the co-ordination of the railroad and highway movement of merchandise, and a collaboration of the railroads and the teaming interests. I have been assured by some of the leading transportation engineers of your association that the accomplishment of this is possible, while a few years ago it was my privilege to review an engineering study of the highway freight movement in the city of Boston, which was made by one of them. His investiga-

tions supplemented those of the metropolitan improvement board of 1907, the scope of whose studies related principally to improvements in and extensions of terminals, docks and highways. His conclusions forcibly emphasized the necessity for some systematic method of handling this team tonnage, to accomplish which he advocated co-operation between the railroads and a consolidation of the trucking interests, resulting practically in an extension of railroad operating methods beyond their terminals. This plan is merely an acknowledgment of the unity of the terminal transportation problem, and appeared to me to be a logical solution of terminal freight congestion. Its principal advantage to the railroads lies in a train schedule system of operation and a marked reduction in the detention of freight on the railroad premises.

There is no reason why a powerful and efficient trucking organization of this nature should not only effect an enormous saving over present cost, but render greatly improved service through the employment of scientific and efficient methods of operation and a truck dispatching system worked out along the same lines as is the train dispatching and car distribution systems of our railroads.

This would prevent the use of a five-ton truck for carrying a small lot of freight weighing only a few hundred pounds, one or two miles across the city, by arranging to have that truck move via a definite schedule to its destination, picking up en route sufficient other parcels of freight to utilize to the fullest extent the carrying capacity of the vehicle.

Amplifying the Plan.

Furthermore an organization of this kind could probably establish central clearing stations at convenient points in the business districts to which light capacity vehicles could be run from nearby warehouses and from which consolidated loads could be moved in high capacity trucks to the railroad and steamship terminals, bringing back on their return similar heavy loads of inward freight for redistribution from the central station. Thus we could secure substantially an extension of the railroad operating methods beyond railroad terminals. Warehouse-to-warehouse delivery is successfully carried on in Europe and from the fact that over 60 per cent. of our city freight haulage in Boston, New York and Chicago is done under contract with truck men it is evident that the business world in our large cities would welcome an improvement along these lines. This proposition recognizes the substantial unity of the terminal transportation problem and the solution suggested will afford the railroads practically an extension of its system of operation beyond its present terminals. The efficiency of every transportation line is in a great measure limited by the adequacy of its terminal facilities. No railroad can be more efficient than its terminals permit it to be.

Confusion or congestion in freight terminals will react throughout the entire transportation line using that terminal, hence I am confident that the solution of terminal freight congestion lies along the lines of improved street transportation by the trucking industries, through consolidation.

This matter has been given a great deal of study by certain of your members and I am glad to present my observations on the subject from a railroad man's standpoint and suggesting what seems to me to be the logical solution of the problem of terminal freight congestion.

NEW YORK CONTINUES CALLAN LAW.

The New York legislators sidestepped practically every measure, pending when the legislature adjourned, that related to motor vehicle registration and control, and the Callan law, which became operative Aug. 1, 1910, will continue in force for another year, at least. The proposition that the registration tax be \$2 a year and that the vehicles be taxed as personal property in the communities where they were owned fell by the wayside, largely because it would have increased the revenues of the cities from local taxation and reduced the state revenue correspondingly.

The Murphy-Potter Company, Detroit, Mich., has changed its name to the Bronze Aluminum Foundry & Machine Company, this being in keeping with the character of its products. William E. Carpenter, after a service of three years as sales manager, has been made general manager of the company.

A quarterly dividend of 1.75 per cent. was paid by the Westinghouse Electric & Manufacturing Company on its common stock April 15, and a dividend of one per cent. on the common stock was paid April 30.

MAYO HEIRS BUY KNOX PLANT.

Springfield Property Sold for \$631,090, 75 Per Cent of the Appraisal Value.

The plant of the Knox Automobile Company at Springfield, Mass., including the real estate, buildings, machinery, patents, material and the unfinished products in the factory, have been purchased by Edward O. Sutton, acting for the estate of Alfred N. Mayo, former president of the company, whose claims against the property aggregate about \$1,000,000.

The sale was made by the trustee in bankruptcy, Charles G. Gardner, April 24, and after bids aggregating \$5855 had been made by individuals for three dwelling house properties, subject to incumbrances of \$7400, a bid of \$350,000 was made by Mr. Sutton. To the sale of the property vigorous objection was made by John P. Wright of Boston, who claimed to represent a majority of the stockholders of the company, who maintained that the consummation of the disposal would be fought by the committee on the ground that it was invalid, illegal and against the interests of the stockholders.

This bid was not accepted by the trustee in bankruptcy, who continued the sale until April 29, when a second series of bids were made by Mr. Sutton that aggregated \$631,090 for the property as a whole, and he stipulated that he would be willing to convey to the trustee or his nominees the three properties for which bids had been previously made, and which had been provisionally approved by the trustee. Mr. Wright again protested against the sale of the property, declaring it could not be legally sold.

The sale was approved by Trustee Gardner conditionally on the approval of the sale by the court, and it was stipulated in behalf of Mr. Sutton that his bid did not apply to any of the property unless he could obtain the whole of it. Mr. Wright stated that the sale would be contested by the stockholders' committee. The property was appraised at about \$1,600,000. The bid of the Mayo estate represented 75 per cent. of the appraised value of the real estate and machinery.

The understanding was that the plant will be continued in operation and that it will be devoted to the manufacture of pleasure cars, but there is probability of the continuance of the production of Knox-Martin tractors, which was a considerable part of the business for the year and a half previous to the sale.

The creditors of the Standard Roller Bearing Company, Philadelphia, Penn., have proposed that the receivers of the concern have a year in which to re-establish the business or to liquidate it. The company has an indebtedness of approximately \$1,500,000, this being to bondholders, banks and general creditors in proportions of about a third each. The quick assets are appraised at \$792,000 and the assets \$1,831,432.

STONE IS GENERAL MANAGER.

Motor Truck Club of America Activities Now Directed by an Executive.

The activities of the Motor Truck Club of America are now directed by General Manager Charles E. Stone, he assuming the duties April 1, and the belief of the members and officers is that with giving his personal attention constantly to its interests the scope of the organization will be greatly increased.

The club has for a long period been energetically promoting the use of motor vehicles in New York City in particular, and its methods have been of a character to attract attention throughout the country. The club was first organized by men directly connected with the industry and trade, and they immediately interested others owning and operating machines, and then turned to the investigation of conditions and problems having bearing upon or affecting the economical operation of all vehicles, both motor and animal.

The policy of the club has been broad, and instead of antagonizing interests of any character the club has sought to demonstrate the possibilities for transportation economies, bringing into conferences and rational consideration of local and state conditions men of prominence in municipal and state affairs, and promoting relations that are certain to be of material benefit. Various civic bodies have been invited to join with the club in every movement inaugurated and investigations have been begun that will lead to better systematization of traffic, improved facilities for traffic between different sections of the city and with New Jersey cities, improvement of the handling of incoming and outgoing freight at the stations, as well as the dissemination of information for the express benefit of those who own and operate machines.

The club has the benefit of a large and enthusiastic membership, that is anxious to promote its activities, and this has directed its endeavors in many channels, all of which are promising. When first formed the club was dependent upon the officers, who gave liberally of time that was valuable to them, and as the work of the club was developed many of them made material sacrifices for the promotion of the organization. The conditions became such that the progress depended largely upon the management, which could not be assumed by any one member. Eventually Charles E. Stone, a member who had been particularly active, who had been secretary and treasurer of the club and who has long been identified with the industry and trade, because of his personal concern and confidence in the work that could be accomplished, was elected general manager. He has assumed the duties of the office and has already inaugurated system and methods so that membership in the club will be of more practical value to any member, for he has available the resources of its organization and refer-

ence library, and the advice of a man who is intimately informed concerning all data that might be desirable.

Always available is the information bureau of the club, which has been created with the object of stimulating the use of motor vehicles, thus promoting the interests of the industry and, by the accumulation of data relating to transportation efficiency and economy, making possible the realization of the fullest practical utilities of machines in any service. As these data are in many instances of transportation departments in New York City and vicinity, where conditions are especially adverse and require extremely careful study to be met successfully, they can be accepted as dependable demonstrations of service.

NEW BOSCH SUPPLY STATIONS.

The following new supply stations are announced by the Bosch Magneto Company: Motor Supply & Tire Company, Akron, O.; Albany Garage Company, Albany, N. Y.; Augusta Garage, Augusta, Me.; Bangor Motor Company, Bangor, Me.; Bath Auto & Gas Engine Company, Bath, Me.; Motor Tire & Supply Company, Cleveland, O.; Troy Automobile Exchange, Cohoes, N. Y.; Motor Tire & Supply Company, Columbus, O.; Warren Garage, Elkhart, Ind.; Pearce Street Garage, Gloucester, Mass.; Blair Motor Company, Logan, Utah; Court Motor Car Company, Marietta, O.; George W. Roberts Electrical Works, Marysville, Cal.; Minot Auto Company, Minot, N. D.; J. P. Gayle Supply Company, Newport News, Va.; Port Washington Garage, Port Washington, N. Y.; Provo Machine & Foundry Company, Provo, Utah; St. Albans Foundry Garage, St. Albans, Vt.; Jensen Bros. Auto Company, Santa Cruz, Cal.; Gavin-Williams Company, San Diego, Cal.; Troy Automobile Exchange, Troy, N. Y.; Utica Cycle Company, Utica, N. Y.; Morgan & Williams Company, Warren, O.; Brass City Auto Company, Waterbury, Conn.

The Killen-Strait Manufacturing Company has succeeded the Killen-Walsh Manufacturing Company of Appleton, Wis., the reorganization creating a capitalization of \$200,000 and providing equipment and facilities for building tractors and freight highway vehicles. The experimental work has been concluded and the company now has designs that will be produced in such numbers as demand justifies. The factory will be considerably increased in size.

The Little Giant Sales Company, of which E. H. Habersham is president and general manager, has become agent for the Little Giant truck in Baltimore, Md., and vicinity and has established a station and offices at 1223-25 Park avenue in that city.

The Drednot Motors, Ltd., with capital of \$100,000, has been incorporated at Montreal, P. Q., to engage in the manufacture of motor wagons and trucks.

ELECTRIC VEHICLE PRACTISE.

Conditions of Electrolyte Indicated by Densities---Practical Hydrometers and Testing Sets--- Forms of Records to Be Used in Charging, and Formulae by Which a Lead-Acid Cell May Be Charged at High Rates.

By William W. Scott.

ASSUMING that a battery is in normal condition, that is, with the specific gravity of the cells approximately uniform, the standard efficiency—the amperage capacity—can be expected on discharge, and the useful work obtained will be practically what is estimated for it. If the voltage of any one or several cells be low this will have its effect upon capacity, and the work will be materially reduced.

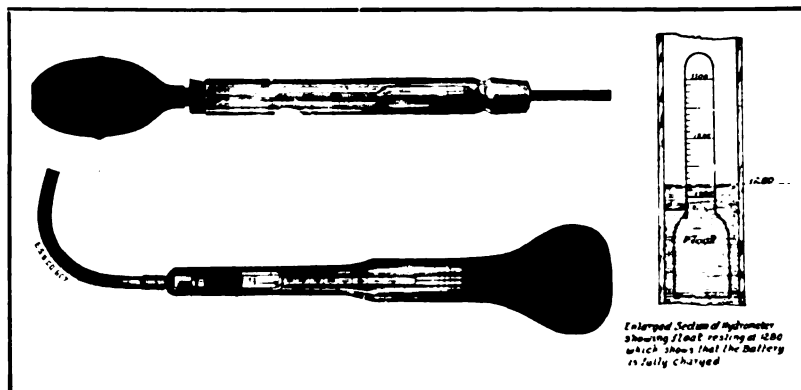
When a battery has been shipped with a vehicle it is assumedly new, and it will gain somewhat, that is, with each successive charge and discharge the total amperage accumulated will gradually increase until a maximum is reached, and from that point the amperage will slowly lessen. The result stated will obtain if the greatest care is observed in operation, for this is a characteristic of a lead-acid cell, and eventually the battery will reach a condition where it will afford very little if any useful work. For instance, assuming a battery that will have a reserve after driving a chassis 50 miles, half of the distance loaded, when first installed, the capacity will be gradually decreased through use until the mileage that can be obtained may not be more than 10 miles, and it would be possible to use it until there was just sufficient power to move the machine 50 yards. But as a regular service is expected of any vehicle, and the condition of the battery would be known, when the power would be so reduced that it would be sufficient for the work, restoration of the battery would be imperative.

Emphasis has been made of the necessity of regularity in charging and discharging a battery, because this means not only greater efficiency, but a longer continuance of service, and the operating expense is minimized. Fully discharging is the most economical, and complete charging is decidedly the better, when these are possible, because there is minimum deterioration. Reference has been made to the loss of capacity—the lessened amperage—when the discharge rate has been hastened, and this means that there will be a loss of current that could be used proportionate to the rapidity of the discharge. The ratio of this reduction has been previously explained. Unless the voltage of the cell falls below 1.7, however, there is no material effect of the rapid discharge, aside from the loss of energy, but as charging is al-

ways an item of expense there is no good reason why a battery should be discharged at less than the normal rate, save in the event of emergency.

When a battery voltage falls to 1.7 and discharge is stopped there will be a slight recovery, for the voltage will rise within a short time, the degree of rise depending upon the rapidity of amperage reduction, but if this was slow the difference will be hardly noticeable. Generally speaking, however, there would be no greater consumption of energy with an indication of 1.68 volts at the end of a quick discharge than with 1.8 volts indicated with the normal rate of current flow.

The danger from excessive sulphation, resulting from over-discharge, is, however, of material importance, for this can only be reduced by the use of



Two Forms of Hydrometer Syringes Used for Testing Specific Gravity of Electrolyte and the Manner of Indication.

more current in charging, which means added expense, and there is probability of deterioration of the plates because of the necessity of reducing the sulphate to obtain the full efficiency of the battery.

There are the variables that must be considered in battery service, the condition of the element, the condition of the electrolyte and the temperature, and the influences of these can best be minimized by normal operation so far as this may be practical. Considering these variables in the order stated it will be understood that the greatest care that can be given the plates is by attention to charging, using a formula and adhering to it so far as this may be done. Undoubtedly the plates of cells will differ, but this is a condition that the batteryman cannot control, and so long as he gives careful attention to charging and discharging he is reasonably certain to have good results.

The condition of the electrolyte, however, is en-

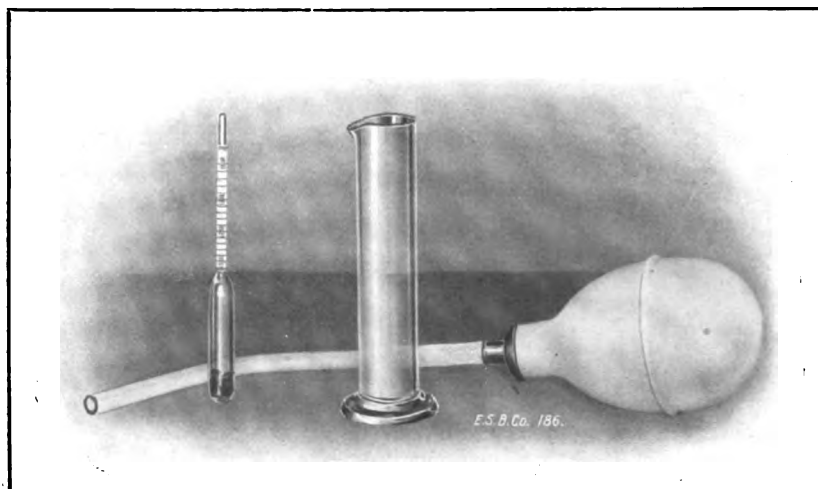
tirely within the control of the batteryman. There is no good reason why the cells should not be examined frequently, and the electrolyte tested to ascertain its specific gravity. The height of the solution in the cells can be determined practically at a glance when one has had experience. The element submerged to a depth of a half-inch, covering the separators a quarter-inch, will substantially meet all requirements. Good practise dictates removing the cover plugs from the cells before charging, and, if, accessible, observation of the electrolyte may be made. But in the event the crates are not readily removable the depth of the solution can readily be determined with a strip of hard rubber placed in the opening in the cover. The rubber strip can be marked with the height the solution should have in the cells, and if inserted into the electrolyte the condition can be discerned instantly by the relation of the wetted surface and the mark. With the cells in a known position and with an inspection card note can be made of those in which the level is low. Having determined the height of the electrolyte in the cells, restoration of those that are low

the acid content of the electrolyte, and the gassing and slopping reduce the volume. As the height of the electrolyte is maintained by the addition of distilled water, the effect is a gradual reduction of the acid content, and eventually a density is reached when the efficiency is so much lessened that the acid must be replaced. Theoretically the restoration ought to be made very frequently, but in practical operation the efficiency is not found to be materially affected until there is a considerable loss of the acid content.

The reason for maintenance of the height of the electrolyte is that any portion of a plate that is exposed to the air will sulphate rapidly, and in a comparatively short time this sulphation will have reached a stage where it cannot be reduced by practical means. Not only this, the part of the plate that is submerged will be deteriorated by the relatively higher discharge rate in direct ratio to the decrease of the active area, for the work required of it will be more than the plate was designed to withstand. Incidentally, it may be well to state here that an element ought not to be exposed to the atmosphere save under the conditions that shall be stated. As the height of the solution will influence all plates in a cell and the separators, the need for giving it careful attention is obvious. Addition of distilled water is a work that requires comparatively little time, and for this reason ought never to be neglected. The loss of electrolyte from a leak will be considered elsewhere.

The density of the electrolyte, however, must be determined by hydrometer readings, observing the standards as established by the battery makers. The hydrometer may be one of several forms, but should be as large as is practical to use that the scale may be read readily.

Usually, hydrometers are calibrated to indicate from 15 to 35 degrees Baume and from 1.100 to 1.300 degrees density, but the Baume scale is not a necessity. The graduations, however, should show single degrees. The hydrometers usually used are primarily a syringe construction, consisting of a glass tube with a rubber bulb fitted at the upper end and a rubber or combination rubber and glass nozzle at the lower. Within this tube is a float consisting of a glass bulb with a long stem on which the graduations are marked. The nozzle is inserted into the liquid and the large rubber bulb compressed. A quantity of the solution is drawn into the tube and the marked float stem will indicate the density. If the float is much submerged the gravity is low, but if it rises the gravity is high. With this form of instrument the reading can be taken very quickly and at any convenient light if the work is at night. The forms of hydrometers differ, and the sizes vary, but the capacities are generally from two to three ounces, and the extreme lengths from 10 to 15 inches. If provided with flexible nozzles



A Typical Acid Testing Set, Consisting of a Tube, a Bulb Syringe and a Float Carrying a Graduated Scale.

can be made by the addition of distilled water. This should be done before charging is begun.

The loss of the electrolyte will result from evaporation, which will be more in hot weather than in cold; from gassing and from slopping. Should a jar be cracked there will be loss from leakage. The three causes first named are certain, and that last named is a possibility. The water will be diminished by evaporation, but both the acid and the water will be reduced from gassing and slopping. The loss in any case will be comparatively slow, save when a jar has been cracked. The evaporation must be through the vent hole in the cover plug, save when the battery is charging, and the loss from slopping may be from a loosened plug or violent movement, as from extremely rough road. The hydrogen and oxygen gas liberated in the form of bubbles will be impregnated with acid. With average conditions of operation the loss in several days, or even a week, will be really trifling, but there will be a loss. Evaporation concentrates

The largest size hydrometer that can be used conveniently is much the better instrument and the

A Practical Form of Charging Report Covering a Full Period by Hours.

Where the charging is by the gravity method it is necessary to make very frequent readings of the hydrometer, at the beginning of the charge and at stated intervals as it progresses, usually at intervals of a half hour, this giving 16 indications, but this is generally done with a pilot cell. With gravity charging a reading of the cell voltage may be made with a low reading voltmeter to establish the general condition of the battery, and then charging may be begun, the amper-

age being established at the given rate and continued until the cell begins to gas freely. At this point the amperage is reduced to the finishing rate and the charging continued to a point where the cell again gasses and the hydrometer shows no change in density.

The filling of the cells with distilled water is a work that can be done practically at any time. Should the density of the electrolyte be low the time for learning its condition accurately is at the conclusion of a complete charge. If the solution is weak no ill result will follow unless the specific gravity is extremely low, but when the electrolyte is strong there is increased local action and greater sulphation. Unless the battery has been fully charged the hydrometer may not indicate the exact condition of the solution, because of the sulphate that may not be reduced. This may be a result from insufficient charging, the sulphate accumulating and, because of ignorance, acid has been added to the cell. By this is meant that where the sulphate exists on the plates and more acid has been supplied because of the supposition that the solution is weakened, there will be greater strength of electrolyte than is necessary, which promotes local action.

The different makers all advise the cells be charged at stated intervals, from one to two weeks, for from one to two hours after the voltage and the specific gravity have ceased to rise, and when such a charge has been given the electrolyte should be tested. The lengthened charge will reduce the sulphation to an extent where the test of the cells ought to show the condition accurately, and if any of the cells are low in density these should be charged separately at a low rate. If this slow charging restores the cells to approximately the specific gravity of the others, one may assume that the cause of lessened capacity is confined

Charging Record Providing for 10 Vehicles with Readings Taken at Half Hour Periods.

to the cells—it may be sulphation or possibly a condition that requires other treatment than charging. But if the density does not increase and the temper-

ature does not rise it is a fairly safe conclusion that the electrolyte has been weakened by the addition of water. This loss may have resulted from a leak.

The specific gravity of the cells ought to be approximately uniform, and if when corrected for temperature the density is low electrolyte should be added. The fresh solution should be of the density specified by the battery manufacturers, and it can be prepared by the battery man. One part of 1.835 acid to 4.75 parts of distilled water will give a specific gravity of approximately 1.200 and one part of 1.835 acid to three parts of water will give a specific gravity of about 1.275. The mixing should be done in a clean glass or glazed earthenware vessel and the acid should be poured slowly into the water, and the solution stirred with a wooden paddle or spoon. The mixture will heat considerably, and should be cooled to room or atmospheric temperature to learn its correct density. This electrolyte can be added to the cells in whatever quantity is necessary to restore them to the gravity desired.

Record made of the voltage and the specific gravity of each cell is of material importance, as it is practical by comparison to determine variance, and to establish conditions that ought to receive attention. The importance of restoring low cells cannot be under-estimated. Low voltage cells will not only reduce the operating voltage of the entire battery, but will possibly be completely discharged and "reverse"

or establish a condition that will considerably lessen the efficiency of the battery, as well as being seriously affected from the excessive sulphation. While the charging is in progress cadmium tests can be made which will determine the state of the cells, but such tests cannot well be made when discharging unless during test discharges, which are advised from time to time as a means of learning accurately the condition of each battery unit.

The reason for charging a battery slowly is that there shall be the least deterioration from the reduction of the lead sulphate, and so long as a cell does not gas one can safely assume that the deterioration is as low as it can be controlled, and while supplemental or "boosting" charges can be given in the event of need it should be understood that the constant use of such excess current is not advised. "Boosting" as the term is usually accepted means the charging at higher rates than are specified as normal, and a battery may be "boosted" when completely or partially discharged, but the custom is to add to the charge sufficient energy to meet any unusual requirement. For instance, if a machine is to be driven further than the mileage that is practical with a full charge, the battery may be partially charged at a convenient place and the run continued, or where the work is such that the battery will be greatly reduced it can be given additional capacity when time will permit.

The following statement by the Electric Storage Battery Company relative to "boosting" with batteries of its production will demonstrate the possibilities of practical usage, and can be accepted as being authoritative:

"Modern methods of operating electric vehicles have developed situations where boosting can frequently be applied to advantage, and in many cases this is not realized by the vehicle owners or operators. It is our purpose here to show how boosting can be advantageously used and how it may be practically applied to batteries of the Exide types.

"The fact that overcharge at high rates is injurious to lead batteries has caused a very general misapprehension as to the ability of the Exide types to absorb current at high rates under proper conditions. The only factors in high rate charging which act injuriously are gassing and heating, and these appear only when more current is being passed through the battery than the plates can utilize. Therefore any current rate which the cells will absorb without gassing is not injurious, and it is upon this principle that boosting is applied. The more nearly discharged a battery is the higher charging current it can take, and by starting the charge at a high rate and tapering to a low rate at the end a large proportion of the discharge can be put back in a very short time.

"To illustrate what can be accomplished by boosting, the following table gives the additional battery capacity which can be obtained by constant potential boosts with the battery in different states of discharge:

NAME OF COMPANY	
(Half hourly readings)	
Volts	Amps
119	46
118	45
117	44
116	43
115	42
114	41
113	40
112	39
111	38
110	37
109	36
108	35
107	34
106	33
105	32
104	31
103	30
102	29
101	28
100	27
99	26
98	25
97	24
96	23
95	22
94	21
93	20
92	19
91	18
90	17
89	16
88	15
87	14
86	13
85	12
84	11
83	10
82	9
81	8
80	7
79	6
78	5
77	4
76	3

Batt. No. Car No.
 No. and Size of Cells
 Make

Battery Charging Record to Provide Detail of Voltage and Amperage Readings for Half Hour Periods.

	30-Minute Boost, In- crease P.C.	40-Minute Boost, In- crease P.C.	One Hour Boost, In- crease P.C.
Battery fully discharged.....	22	38	50
Battery three-quarters discharged	19	33	42
Battery one-half discharged.....	15	26	32
Battery one-quarter discharged..	10	16	20

"Expressed in terms of mileage, this would mean that a vehicle, after having given 40 miles on a complete discharge, could have its battery boosted as follows:

"In 20 minutes so as to give nine miles additional.

"In 40 minutes so as to give 15 miles additional.

"In 60 minutes so as to give 20 miles additional.

"As a concrete example, suppose a delivery truck has to cover a mileage in one day beyond the capacity of the battery to deliver. Say that up to the noon hour 70 per cent. of the battery capacity has been used and it is desired to cover an equal distance in the afternoon. Under the straight daily charging system it would be necessary to have a spare battery and change over, or else provide a single battery of sufficient capacity for the entire day. Under the boosting system, however, the battery can be put on charge during the noon hour, and in that time it is possible to get in sufficient charge to duplicate the morning run. That is, 140 per cent. of the battery capacity is obtained in one day by simply giving a boosting charge of one hour at noon.

"A situation where the ability to boost is advantageous arises from the extra demand upon batteries under bad weather conditions. A battery may have ample capacity to give the desired mileage under normal conditions, but not when the roads are heavy, as after a snow storm, and the car draws an abnormally high current. By boosting when the conditions are bad, the battery can be made to meet the extra demand and no inconvenience result.

"There are several methods by which boosting can be practically applied to batteries of the Exide types, and the method to be chosen depends upon the available charging facilities and other conditions in individual cases.

"1. Constant Potential. Where conditions permit, this is probably the ideal method, since it is entirely automatic and requires little attention. It is applicable where there is available voltage of about 2.3 per cell of battery (e. g., 110 volts for 48 cells) and the charging equipment and wiring have sufficient capacity for current rates up to four or five times the usual starting rate charge. A voltage higher than 2.3 per cell can be cut down by having a set of counter electromotive force cells, figured at three volts per cell, which are always put in series with the battery when it is boosted. Thus, if the line voltage is 110 and the battery consists of 40 cells, there will be 18 volts to be taken up by counter cells, and six of them will be required.

"With the charging voltage thus fixed at 2.3 volts per cell, a battery in any state of discharge can be put on charge and will receive in a short time a large proportion of the amount of discharge which has been

taken out. The current will automatically taper from a high rate at the start to a low rate toward the finish, and no attention or adjustment is required. The cells will not reach the free gassing point or, under normal conditions, a high temperature, and therefore no harm will result from their being inadvertently left on charge longer than necessary.

"2. Approximate Constant Potential, with Fixed Resistance in Series with the Battery. When the time available for boosting is limited to one hour or less, the following method is often the simplest: Connect a rheostat in series with the battery and adjust the resistance so that the voltage across the battery terminals corresponds to that given in the battery below for the appropriate number of cells. The circuit can then be left without further adjustment for an hour or less, and the current will taper off as the voltage of the battery rises. The table is figured for a line voltage of 110-120, and the voltages given are too high for a boost of more than one hour's duration:

Number of Cells	Voltage at Battery Terminals
48	110
44	98
42	92
40	86
38	80

"3. Constant Current. In some cases it is more convenient to give a boost at a constant rate of current; as there is generally a limited time available, it is desirable to know under any given conditions what rate as safe. A convenient rule for determining this is as follows:

$$\text{Charging current (amperes)} = \frac{\text{ampere-hours already discharged}}{1 + \text{hours available for boosting}}$$

This gives the maximum current which can be used

TABLE OF BOOSTING RATES								
AMPERE HOURS DISCHARGED	TIME AVAILABLE FOR BOOSTING							
	1/2 hour	1/2 hour	1/2 hour	1 hour	1 1/2 hours	1 1/2 hours	1 1/2 hours	2 hours
	Ampers	Ampers	Ampers	Ampers	Ampers	Ampers	Ampers	Ampers
10	8	6	5	5	4	4	3	3
20	16	13	11	10	9	8	7	6
30	24	20	17	16	15	12	11	10
40	32	26	23	20	18	16	14	13
50	40	33	28	25	22	20	18	16
60	48	40	34	30	26	24	22	20
70	56	46	40	35	31	28	25	23
80	64	53	45	40	35	32	29	27
90	72	60	51	45	40	36	33	30
100	80	66	57	50	44	40	36	33
110	88	73	63	55	49	44	40	37
120	96	80	68	60	53	48	43	40
130	104	87	74	65	58	52	47	43
140	112	93	80	70	62	56	51	47
150	120	100	86	75	67	60	54	50
160	128	106	91	80	71	64	58	53
170	136	113	97	85	75	68	62	57
180	144	120	103	90	80	72	65	60
190	152	127	109	95	84	76	69	63
200	160	133	114	100	89	80	73	67
210	168	140	120	105	93	84	76	70
220	176	147	126	110	98	88	80	73
230	184	153	131	115	102	92	84	77
240	192	160	137	120	106	96	87	80
250	200	167	143	125	111	100	91	83

EXPLANATION.—In the left hand column find the figure nearest to the ampere hours discharged from the battery; follow across to the column headed by the available time. The figure at this intersection is the current to be used.

EXAMPLE.—Ampere hour meter reading, 183 ampere hours discharged; time available for boosting, one hour. Start at 180 in the left hand column; follow across to the column headed 1 hour and find 90, which is the current to be used.

Tabulation of Amperage Required for "Boosting" Cells at Differing Stages of Discharge and for 15-Minute Periods up to Two Hours.

for the time specified without reaching the gassing point. The method is most conveniently applied where the car is equipped with an ampere-hour meter.

"As an example, suppose that 100 ampere-hours have been taken out of the battery, and there is one hour available for boosting. Then

$$\text{Charging current} = \frac{100}{1+1} = 50 \text{ amperes}$$

"In general, the above method will not put in as much charge in a given time as the constant potential method, and the current must not be continued beyond the time for which the rate is figured, as injurious gassing and heating will result.

"In order to save calculation, we give on the next page a table based on this formula. Knowing the ampere-hours discharged and the time available for boosting, the proper charging current, irrespective of the size of the battery, can be read off at a glance.

"When any considerable time for boosting is available and it is convenient to regulate the current at intervals, a greater amount of charge can be put in by dividing the time into periods and finding the current for each period separately.

"One of the methods outlined above is almost sure to meet the requirements of any individual case; but whatever method is used, remember:

"To obtain the advantages of boosting without injury to the battery, avoid gassing and keep the cell temperature below 110 degrees Fahrenheit.

"A general realization of the possibilities and advantages of boosting can result only in a wider field for the electric vehicle".

(To Be Continued.)

GENERAL MOTORS BUSINESS.

The business of the General Motors Company, of which the General Motors Truck Company is a subsidiary corporation, has shown a consistent increase thus far the present year, and the belief is expressed that by the end of the fiscal year, which will be July 31, the net profits will approximate \$10,000,000. The company has largely increased its gross sales during the last nine months, and this will probably be continued the greater part of the remaining period.

George H. Duck, president of the Motor Truck Club of America, has resigned as manager of the truck sales department of the Locomobile Company of America and has been succeeded by Frederick F. Colver of the Philadelphia branch of the company. Mr. Duck has not as yet announced his plans.

The Anderson Electric Car Company has appointed A. H. Dorsey, formerly with the Ontario Motor Car Company, Toronto, Ont., manager of sales at its Chicago branch, succeeding W. J. Gordon. Mr. Dorsey has had a long experience with electric vehicles.

RIGHT OF UNLIGHTED VEHICLE.

The supreme court of Iowa has decided that lights are not required at night by law on motor vehicles standing in the street, but not operated, and this decision is of material interest to all owners of machines of any character, for the provision of the laws with reference to lamps and lighting have been interpreted by police authorities as a rule to mean that whether moving or standing the number of lamps lighted shall be the same.

The question has been discussed, for the statutes generally specifically state "operated" with reference to any form of regulation established, and no determination had ever been reached. The case referred to was that of N. G. Kraschel of Harlan, who was charged with violating the law in not having the lamps of a machine lighted when it was standing at the curb of a street in that city. He was fined and appealed, carrying the case to the supreme court. The claim was made by the prosecuting attorneys that the city ordinance required the machine to have two front lamps and a tail lamp burning, either moving or stopped, so long as it was in the highway. The opinion of Justice Evans included the following:

"A standing car is not in the ordinary sense being operated or driven, neither is it proceeding in any direction. There is no more reason why a standing motor car should display lights than any other vehicle".

TO MAKE KEROSENE VAPORIZERS.

A kerosene vaporizer that is expected to be particularly adapted for motor truck engines has been perfected by E. P. Gould, chief engineer of the Affiliated Manufacturing Company, Milwaukee, Wis., and its manufacture will be begun by that concern as quickly as the preparations can be made. The statement is made that this vaporizer can be adapted for any of the present types of gasoline motors without changes, and that the fuel economy is approximately 66 per cent.

RUBBER GOODS COMPANY'S DIRECTORS.

The stockholders of the Rubber Goods Company, at the annual meeting in New York City, re-elected the old board of directors to serve for the ensuing year, as follows: W. S. Ballou, Nicholas F. Brady, Samuel P. Colt, F. W. Eddy, J. B. Ford, Ernest Hopkinson, C. A. Hunter, Lester Leland, R. B. Price, H. E. Sawyer and E. S. Williams.

M. E. McKenney, formerly advertising manager of Geuder, Paeschke & Frey, Milwaukee, Wis., has been appointed assistant sales manager of the Federal Motor Truck Company, Detroit, Mich.

FEATURES OF 1914 POWER WAGON DESIGN.

Characteristics of Machines That, Seemingly Incidental, Are of Material Importance in Increasing Efficiency and Reducing Expense of Operation.

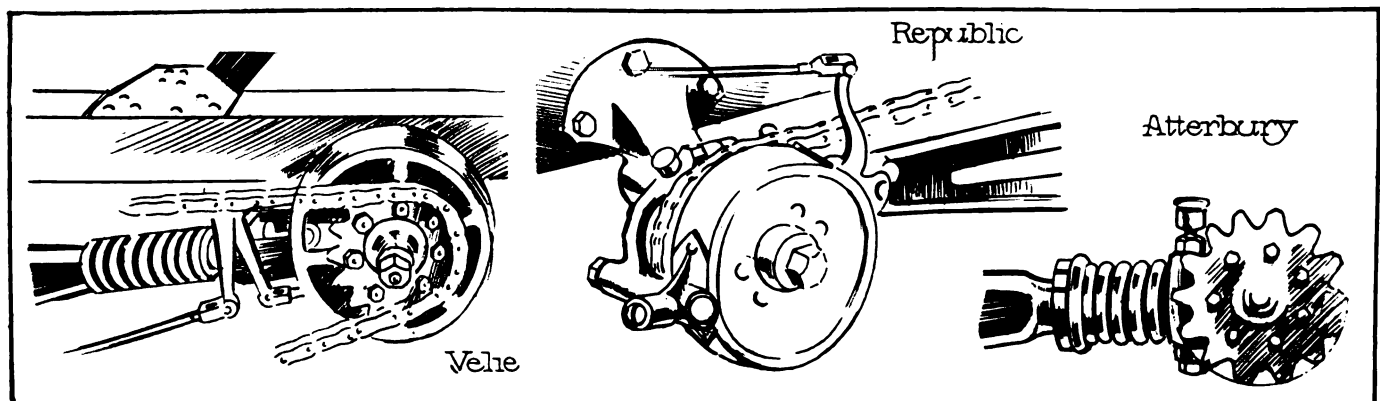
Part II.

A STATEMENT has been made that the tractive effort or driving stress is exerted from the rear wheels through the radius or torque rods, and these are carried forward from the axle to the chassis frame, the connections being usually by brackets, these being either separate or combined with the jackshaft hangers, though in some instances combination is made with the spring hangers.

The radius rods are of numerous types, those used with chain driven machines extending from the rear axle to the side members of the frame, while with shaft driven chassis the rods are connected with a fitting or yoke on the torsion tube or with a cross member of the frame. Some constructions, however, use the same form of rod with shaft drive that is employed with the side chain. No rule can be applied, the designer being governed by experience and re-

mounted on seats on the rear axle, being free to rotate on the seats between two collars. Others of the same general design have a vertical pivot connecting the two forward sections, or the rods may be rigidly coupled to the rear axle and have a rotating movement on the hanger. Still another construction is that in which the rods are mounted so as to rotate on the rear axle, while the connection forward is by a spherical bearing on the jackshaft hanger, so that any stress is taken without material strain.

Much thought can be given to other detail of radius rod design, for the object is to equalize the driving and braking thrusts and to maintain the precise relation of the axle, as well as minimize the stresses upon the chassis frame. Side pressure is to be prevented so far as is practical. Of course the operating torque of the wheels and brakes is communicated



The Spring Buffer Radius Rod of the Velle Three-Ton Chassis, the Jackshaft Hanger of the Republic Ton Wagon, and the Spring Equipped Radius Rod of the Atterbury Two-Ton Truck.

quirements. The radius rods fitted with torsion tubes and carried on a single centre bracket in the frame are rigidly attached to the rear axle, one or more universal joints in the shaft compensating any variation in shaft alignment. With this method of drive the thrust is taken by the frame cross member and the angularity of the shaft is considerably reduced.

Variations in Design.

When the radius rods are carried from the rear axles to the frame side members the designs may be of several types, the purpose being to afford such protection as may be desirable against excessive stress by permitting comparatively free action of the axle vertically, and to a limited extent horizontally. Some constructions are with the forward ends rigidly connected to the hangers or brackets with an adjuster connecting the forward and rear sections, the rear ends being carried on vertical pivots in circular carriers that are

through these rods to the hangers and frame proportionately to the operating conditions. The heaviest stresses are developed when a machine is started when loaded, especially on grades, for the power necessary to move a weight from anchorage will be much more than is needed after movement has been begun, and when brakes are quickly applied, for quick stops must be frequently made. Another cause of excessive stress is contacting with a road obstruction. Because of the extreme violence of these strains the wear on the radius rods and connections is considerable, despite the size of the contacting surfaces, and as the chains and sprockets will wear, the rods must be lengthened to prevent excessive strains upon the springs and shackles, as well as avert possibility of the chains riding the sprockets and breaking.

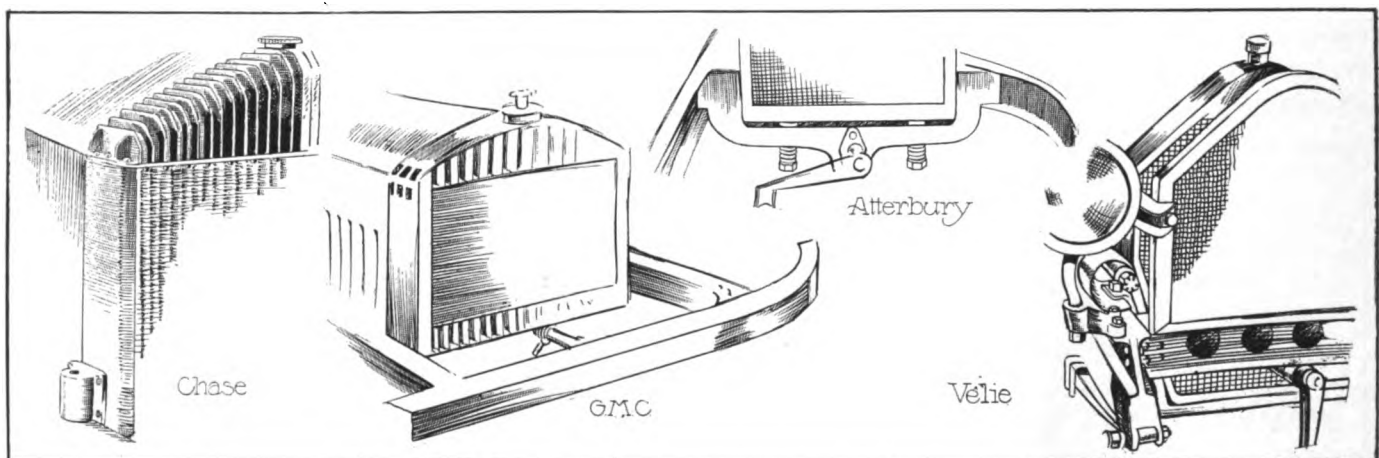
Two American trucks have radius rods designed with heavy springs incorporated with the forward sec-

tions, there being a telescoping coupling to permit the spring action in addition to the usual provisions for compensation of vertical and horizontal movement of the back axles. The first of the designers to adopt this construction developed the Velie three-ton truck, and the same construction has been adopted for the two-ton chassis. The rods are of conventional length and construction aside from the spring and the coupling of the two sections, being mounted on the rear axle and the jackshaft hanger. The spring is helical, of square section metal, with comparatively little space between the coils. This spring surrounds the rod and the rear end is seated against a collar fixed on the rod, and the forward end contacts with a large adjustable collar, so that the tension of the spring can be adjusted to whatever pressure is desired. The spring is of such strength that the movement is comparatively slight, but there is a sufficient cushioning effect whenever the shock is excessive, this protecting the chassis as well as lessening the strains upon the tires. The springs are long, this being necessary because of the number of the convolutions and the minimized movement under

comparatively little thrust directly upon the chassis frame. The springs and connections are packed with grease and protected with leather boots, so there is practically no wear upon them. The springs are proportioned to the work, and the statement is made that the shocks are minimized in extreme conditions. The accompanying sketch shows a spring fitted without the boot.

Republic Service Brake.

The Republic truck service brake is installed on the jackshaft, the drums being of a conventional type with the brake bands contracting on them. The sprockets and the brake drums are carried on flanges on the shaft ends, and the jackshaft hangers, bolted to the frame, each have a bracket slightly below the centre of the shaft in front of the drum, on which the bands are hinged. The clamping lever of the brake is pivoted at the rear on a similar bracket, and the pull rod is carried forward in a direct line and coupled with the linkage. The jackshaft hanger also carries the forward end of the radius rod. The assembly is clean, in every way accessible and extremely simple.



Some Examples of Radiator Construction: The Sectional Vertical Tube Cooler of the Water-Cooled Chase Trucks, the New Type Installation of the GMC 2500 and 4000-Pound Machines, the Spring Supported Atterbury Radiator, and the Screen Protector of the Velie Three-Ton Chassis.

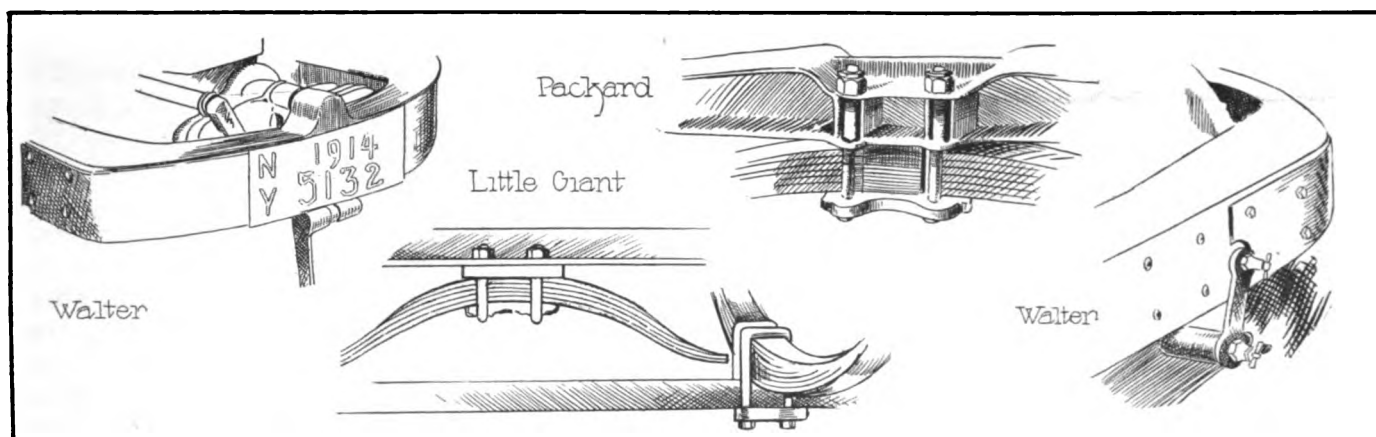
compression, and they are sufficiently back of the service brake drums to be easily accessible for any adjustment that may be desired.

Atterbury Truck Practise.

The rods installed on the Atterbury chassis, from one to five tons capacity, are fitted with heavy helical springs that have practically the same effect, being installed around a short telescoping section of the forward ends of the rods. The springs are much shorter, however, and the metal is round section, but the convolutions are close together. The design differs in that the forward section of the rod, which is carried on the jackshaft hanger, carries a fixed collar, and the rear collar is threaded on the rod, back of this being a large nut with a scored edge, against which the collar is seated. Turning the collar and the check nut will afford any adjustment of the spring, the tension being such as will permit a compression whenever the shock is excessive. The coupling is such that the spring will carry all the load when fully compressed, and there is

The system for cooling the motor of a power wagon is usually much larger than for a pleasure car because of the slow speed of operation and the lessened circulation of air. The water capacity is greater and the radiators are more expensive. The possibility of damage is materially increased and designers have directed much attention to the protection of radiators, and many have sought to minimize repair expense by using types that can be quickly restored in the event of accident. With the honeycomb or cellular radiator the opening of a seam will necessitate a soldering repair, which work cannot always be done by the repairer, and while cement will serve to stop leaks, this material is only regarded as useful for temporary restoration. Soldering generally lessens the radiating surface, and while a permanent repair is practical the work requires time and this means the loss of the use of the machine unless a spare radiator is available for such an emergency.

Many designers have adopted the tubular con-



The Forward Trunnion Supporting the Walter Power Plant, the Cross Spring Installation of the Little Giant Chassis, the Manner of Seating the Jack Spring of the Four-Ton Packard Truck, and the Connection of the Removable Front Frame Cross Member of the Walter Chassis.

struction, the copper tubes being finned to insure conductivity, and these are often installed in cast metal head and base tanks, with side members, or columns, of similar material. The tubes are sometimes soldered into the heads and bases, these making satisfactory joints, and occasionally rubber gaskets are used. Several radiators are built with the tubes in sections, so that in the event of damage these may be replaced, or the holes in the headers and bases plugged temporarily, and the machines continued in service. The sides or water columns and the tanks are bolted together, making a very solid assembly. These will endure much more severe usage, and have the added advantage of being easily and quickly repaired at comparatively small expense.

Chase and GMC Designs.

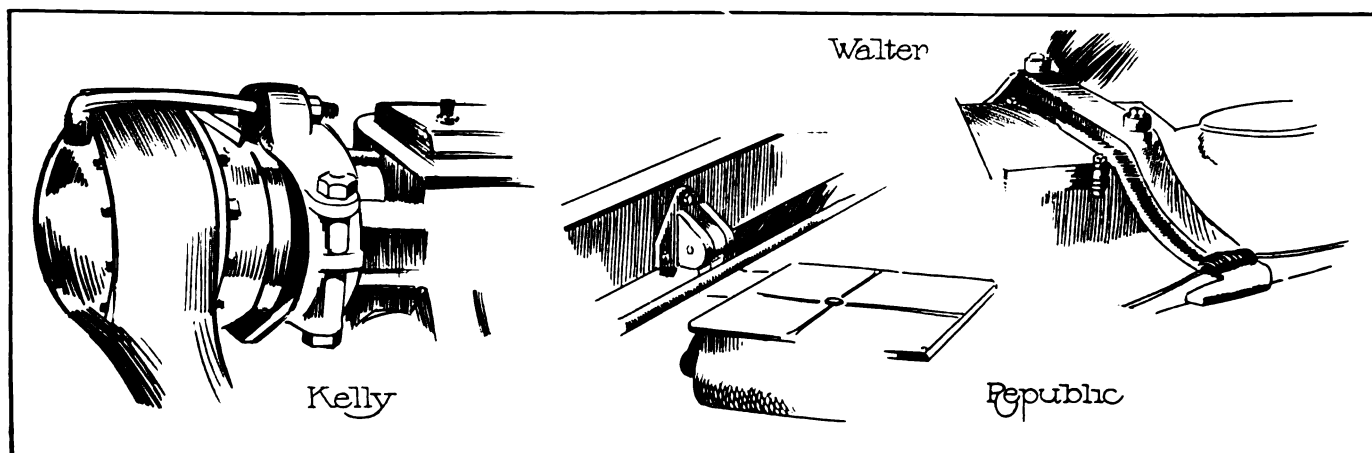
Two examples of tubular construction of recent design may be noted in the sketches of the Chase and the GMC machines. The radiators used for the two and three-ton water-cooled Chase trucks are of the vertical round finned tube construction, with the header a casting with wide fins. In this the tubes are soldered, as described. One or a number of the tubes could be damaged, and with these removed the tank could be plugged and the machine used. Repairing is a simple matter of soldering. These radiators are supported by lugs installed between helical springs in a

housing bolted to the chassis frames, and are not affected by chassis distortion.

The GMC radiator is a different form, but the principle is much the same, the header, base and side columns being one assembly, and into this frame is set a flat tube centre section with the tubing horizontal. The frame can be taken apart, the castings being bolted together, for cleaning, and a spare centre section can be installed with comparative ease. The radiator is installed within the frame, and the side frame members are extended forward, and the front cross member is the full width of the truck body, so that the radiator is unusually well protected. These radiators are used on both the 2500 and the 4000-pound machines.

Protecting Honeycomb Type.

The Atterbury chassis are fitted with honeycomb radiators that have very rigidly constructed frames, and these are mounted on two sets of helical springs that are carried on the frame front cross member. Two heavy bronze bushings are fitted in the frame member, and in these are sockets into which helical springs are fitted. From the bottom of the radiator base two bolts project vertically, and these are carried through the springs and holes in the bushings. Below the frame two shorter springs are seated against the web, clamped by collars secured by nuts on the bolt ends.



The Collar and Clamp Used on the Differential and Gearset Housing of the Kelly Five-Ton Trucks, the Forward Support for the Gearset Case of the Republic Wagon, and the Rear Cross Arm Supporting the Walter Unit Power Plant.

The radiators of the Velie three-ton trucks are a honeycomb type that are installed in a frame in which they are supported on springs, this minimizing any influence from chassis distortion, but protection is afforded by the curved front cross member of the frame, which is carried on extensions of the side members. As an additional protection a heavy wire screen is mounted in a frame of the same form as the radiator, and this frame is supported by bolts through a base flange and by a heavy bracket extending from each of the lamp brackets. The screen insures abundant circulation of air and prevents anything contacting with the radiator.

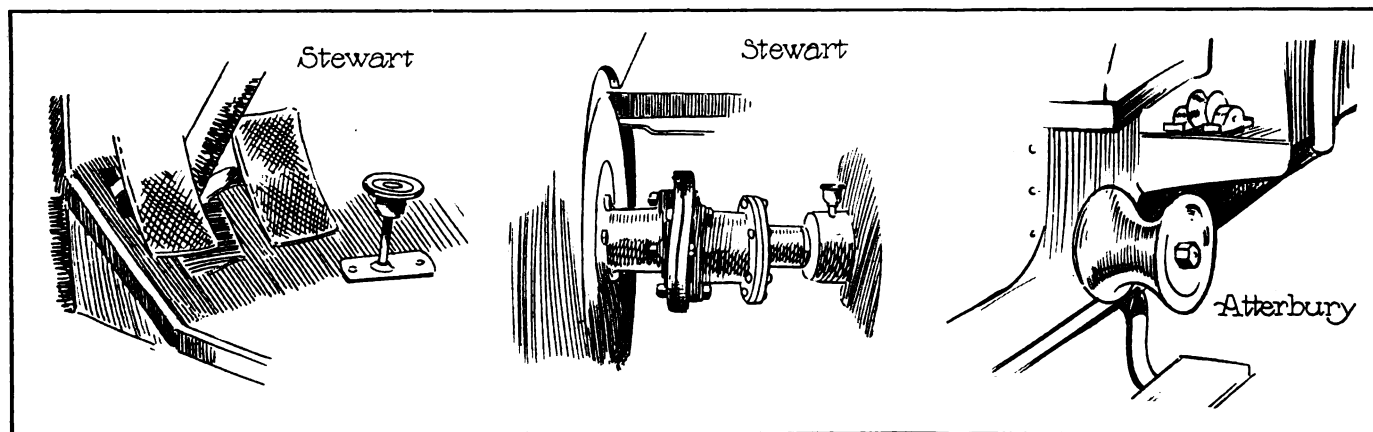
Walter Power Plant Suspension.

The suspension of the unit power plant of the Walter front-wheel driven truck is decidedly out of the ordinary, this installation being with a view of minimizing all effects of chassis distortion. The engine case is cast with a flange that extends back and encloses the lower half of the flywheel. To this is bolted a corresponding flange of the transmission gearset housing, so that the flywheel and clutch are

der the motor it may be drawn forward out of the chassis frame. The illustrations show the heavy frame front cross member with the supporting trunnion and the bolted connections with the side members, as well as the rear support.

Other Three Point Suspensions.

The three point support is also used for the suspension of the gearset case of the Republic truck, there being a heavy lug on the case that is fitted between the arms of a yoke bolted to the centre frame cross member, and supported by a bolt on which the lug will move when the chassis is distorted. The transmission gearset of the Kelly five-ton truck is bolted to a flanged extension of the pressed steel differential housing of the jackshaft. In this extension are the bearings of the gearset shafts, and to supplement this extension and to prevent the possibility of breakage from extreme stress a cast steel clamp is secured about it by bolts, and this is retained by a clamp that is carried across the differential housing and tightened by lock nuts. This affords great strength without necessitating much additional weight.



The Plunger Type of Accelerator Pedal of the Stewart Delivery Wagons, the Daimler Flexible Leather Coupling Between the Clutch and Gearset of the Stewart Machines, and the Special Winch Equipped Atterbury Truck for Freighting Laundry Machinery.

partly enclosed. The gear changing and the emergency brake levers are both mounted on the gearset case.

The forward end of the engine case is built with a centre trunnion that is mounted in a long bearing on the frame front cross member. Back of the dash and under the floorboards is an arched cross beam carried on the frame side members. From this the forward end of the gearset case is suspended by two long bolts that are fitted through heavy upper and lower lugs on the sides of the case, and secured by lock nuts. Any twist of the frame that would lift a side member will not cause any misalignment of the power plant, and no strain can be occasioned. This installation is so designed that by the removal of four bolts at either side of the frame front cross member this can be removed. A sling can be attached to the motor and it can be hoisted clear after breaking the fuel supply, water circulation, exhaust and ignition system connections and removing the two bolts from the rear support; or by placing jacks and horses un-

The installation of cross springs is usually made to a substantial frame member, because the upward thrust when the spring is deflected from the weight of a load or extreme shock is such that unless there is sufficient strength the cross member may buckle. One of the simplest forms of installation is that used in the Little Giant ton wagon, where a wide seat plate is used with a saddle, and the spring is secured to the cross member by clips that are bolted through the seat plate and the web. In the Packard four-ton truck chassis the cross member is a wide I section with the lower web widened to form the spring seat, the channels in the member are reinforced in the line of the bolts, and the upper web dropped over the reinforcements. The spring is attached by bolts through the saddle and both webs of the seat.

Daimler Flexible Coupling.

One of the claims made for the use of the Daimler flexible coupling, which has been adopted by several truck builders, is that this has a sufficient universal action at all times to meet practically any condition;

that it is light, the wear is almost negligible, and replacement is made at comparatively small expense. The Daimler coupling consists of two spiders having three arms, the centres being 120 degrees apart. Each of these is bolted to a series of three or more rings of specially prepared leather so that the bolt centres are each 60 degrees apart. With small sizes round washers are used on either side of the leather rings, but with the large sizes keystone washers are used, these better distributing the strain upon the leather. Most makers use these couplings between the gearset and the differential, either one or two as may be believed necessary, but in the Stewart 1500-pound wagon these couplings are used between the clutch and the gearset, an illustration showing the manner of installation.

A Special Equipment.

One of the oddities of special equipment was noted in an Atterbury truck seen at the Boston truck show. This was specially designed for the transportation of laundry machinery of considerable weight, and which would require a considerable crew of men to handle. To reduce the number of men the truck was fitted with a special winch, operated by the engine. The winch was simple, it consisting of a cross shaft with a drum at either end, outside of the driver's seat. This shaft was connected with the transmission gearset and so coupled that it could be operated in either direction, and controlled by two pedals. Two skids were carried in recesses in the deck of the body, so that these could be drawn out and placed at any convenient angle. The machinery was to be drawn into or lowered from the body on the skid, and with rope attached to it the freight could be handled quickly and without difficulty by the power of the engine, the rope being carried over sheaves directly back of each drum. Aside from the pedals, the sheaves and the drums, no evidences of the equipment appeared. From four to six men would have been necessary to handle the freight usually carried by this truck.

J. W. Johnson has been elected president of the Lee Tire & Rubber Company, Conshohocken, Penn., to fill the vacancy caused by the death of J. Ellwood Lee. Mr. Johnson is president of the Johnson & Johnson Company, manufacturer of medical supplies, New Brunswick, N. J., a concern with which Mr. Lee was long identified.

A quarterly two-day convention of the branch managers and salesmen of the Hess-Bright Company was held at Philadelphia, Penn., April 16-17, the first day being devoted to consideration of business subjects, and developing plans for sales promotion, and the second to factory inspection, amusement and a banquet.

The registration of motor wagons and trucks in Rhode Island was on May 1 very near the 1500 mark, and the registration of pleasure cars at that date exceeded 12,000.

OPENS BIG ELECTRIC GARAGE.

Largest Exclusive Truck Public Service Station Established in New York.

The Exide Battery Depot and Garage, established at 527-41 West 23rd street, west of Tenth avenue, is claimed to be the largest electric vehicle public service station in New York City, and the belief is expressed that it is not equalled in the country. The garage is conducted by the Exide Battery Depots, Inc., and the property occupied consists of a two-story structure that is used for office purposes, and a large one-story building that is given over to storage, battery room, stock room, repair shop, etc.

The building is accessible from the street by several entrances and is well lighted and arranged. Besides the various departments the main floor will store 100 machines of all sizes without encroaching upon the space that is necessary for working on and handling the machines.

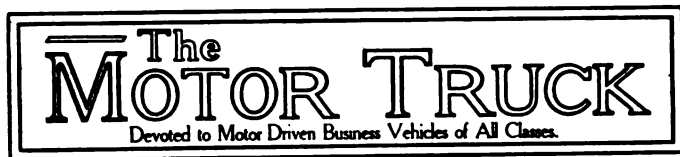
The Exide batteries were for a considerable length of time handled by the New York Transportation Company, and when that concern was merged with the Yellow Taxicab Company the department was directed by F. F. Sampson, and in connection with the sale of the batteries the company maintained an exclusive electric garage in West 25th street, this having capacity of about 60 machines. This was given over to service vehicles and was the largest public service station of the kind in New York.

The business of the department has so much increased, however, and the demand for garage space for electric service machines in the central West Side section has been so insistent that the Exide Battery Depots, Inc., has been organized to give even broader and closer attention to the requirements of owners of wagons and trucks.

The garage has been specially equipped with every facility for affording service for battery users and this department is necessarily large, for a considerable area outside of the city itself is dependent upon this station for attention of all kinds with reference to maintenance. The other departments have been provided with the best of equipment for the differing requirements, quick service, economy of labor and time, and satisfactory results being the primary objects sought. The current is supplied for this station by the United Electric Light & Power Company.

George D. Wilcox, formerly sales manager of the Standard Motor Truck Company, Detroit, Mich., has been appointed sales manager of the Commerce Motor Car Company, which manufactures a 1000-pound delivery wagon, and has its general offices and factory at Detroit.

A dividend on preferred stock of the Peerless Motor Car Company, Cleveland, O., of 1.75 per cent., was paid by that concern April 1.



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Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

REAL ROAD ENGINEERING.

Road engineering of today demands, assumedly, materials that will endure. Practically all authorities are agreed that a macadam highway that will last for a reasonable period with animal traffic is worn to greater ratio when the travel is augmented by motor vehicles. The macadam road, when the surface is bound with bitumen, will endure for years with comparatively trifling repairs, but the surface will quickly disintegrate from the hoofs of horses.

The macadam construction is regarded as an improvement when compared with gravel for general highway purposes, and the expense is greater. Well built gravel road, however, is a much better construction for combined animal and motor traffic than is macadam, because it is consolidated by travel and can be repaired by surfacing, while there is never internal destruction such as develops in all macadam ways. Oil will suppress dust and eliminate insects. The travel on a gravel road, provided reasonable attention is given to filling depressions whenever they develop, will keep it consolidated from the surface to the sub-grade, whether the vehicles be driven by motors or drawn by animals.

The gravel road is worthy of consideration because it costs less than macadam, can be more easily maintained, endures better where there is mixed traffic, and the material is generally obtainable. The general impression is that the gravel road is obsolete. As a matter

of fact its value is not understood by the public and is seldom realized by engineers. Well built, it is practical and comparatively much more economical. The development of the possibilities of this road is an opportunity for real highway engineering.

MOTOR TRUCKS IN WARFARE.

With the prospect of at least military occupation, and possibly warfare, the Mexican situation from the viewpoint of highway transportation is giving the experts of the War Department some anxious hours. The destruction of existing lines of railroad sufficiently to prohibit their use can be easily accomplished, but roads can generally be passed over with temporary repairs, even if damaged. In the event of roads being made impassable, detours are generally possible. The United States has made comparatively little progress with the use of trucks in military operations, which policy is diametrically opposite to those of the European nations, which have anticipated and provided so far as possible for just such exigencies as now exist in Mexico.

Should there be operations in Mexico the advances will necessarily be made by road, because of the comparatively small railroad mileage and the probability that these will be useless until controlled by and repaired by Americans. This being so, the initial army transportation will be dependent upon either animals or motor trucks. To what extent machines would be used is problematical—not from regarding them as experimental, but because of the character of the country in the first instance, and the impossibility of procuring immediately a sufficient number to meet the requirements, without taking those now in use.

TIRE DAMAGE BY OVERLOADING.

With the guarantee of 7000 miles, now very generally applied to gasoline freight vehicle solid tires, which must be obtained in 12 months, there is every reason why owners of machines should give careful attention to economy, and there is no factor of greater importance than limiting freights to vehicle capacity. There is every reason why this care should be taken. The machine driven 50 miles daily for 300 days will cover 15,000 miles annually, and if tires endure the full mileage guaranteed more than two full sets would be necessary. The assumption may be that tires are paid for on the basis of miles driven, but this is not the result obtained in actual service. There is always shrinkage of mileage, no matter how accurate or liberal the adjustments, and with less miles guaranteed and no reduction of price the economy for the purchaser is to get greater results than he is assured of. One of the most certain safeguards is to limit the loads to the vehicle capacity, and to be certain that the machine is equipped with sizes of tires that will endure. If the mileage obtained exceeds the guarantee the owner is saving money.

RESULTS OBTAINED IN MUNICIPAL SERVICE.

Maintenance Figures Revealed by Annual Report of Street Department in New Bedford, Mass.--Relative Economy of Motor Apparatus in New York City--News Briefs.

INTERESTING figures are made public by the City of New Bedford, Mass., in connection with its municipal garage, the annual report concerning which was filed recently with Mayor Ashley by the clerk of the street department, in charge of its maintenance. The total cost of operation, including garage expenses, gasoline and oil, tires, repairs and chauffeurs' salaries, was \$13,039.95, against which was credited \$3100.51, the amount paid to the street department by other city departments for the use of different cars, bringing the net cost down to \$9939.34.

Aside from the fire department vehicles, the city

for municipal machines, and the plan is meeting with wide acceptance in various sections. The report referred to above indicates the wisdom of such action.

ESTABLISHES A PRECEDENT.

Toledo, O., not only has taken the initial step toward the complete motorization of its fire and police departments, but has established a precedent among American cities, in the purchase of five Willys-Knight cars. This is, so far as is known, the first in-

MUNICIPAL GARAGE REPORT SHOWING MAINTENANCE COST OF NEW BEDFORD MACHINES								
	Locomobile	Franklin touring	Franklin runabout	Franklin old car	Abbott-Detroit	White truck	Johnson wagon	Totals
In service, months	12	7	12	5	6	6	12	.....
Miles travelled	17,737	11,005	8055	.....	.....	3500	7300	47,597
Garage expense	\$652.90	\$340.86	\$652.90	\$272.05	\$326.45	\$326.45	\$652.90	\$3,264.51
Gasoline and oil	337.25	134.23	175.41	155.89	183.15	223.86	332.85	1,542.64
Repairs, tires, chauffeur	2597.53	1417.39	404.74	952.41	681.47	424.09	1755.17	8,232.80
Total cost	\$3587.68	\$1932.48	\$1233.05	\$1380.35	\$1191.07	\$974.40	\$2740.92	\$13,039.95
Rental credits	1897.47	808.73	69.41	250.00	.....	.....	75.00	3,100.61
Net cost	\$1690.21	\$1123.75	\$1163.64	\$1130.35	\$1191.07	\$974.40	\$2665.92	\$9,939.34

owns a seven-passenger Locomobile, used by the mayor; an Abbott-Detroit pleasure car, used by the police; Franklin touring car, utilized by the superintendent of streets; Franklin runabout, employed by the assistant superintendent of streets; White three-ton truck and a Johnson wagon. In addition, an old Franklin machine was in service during the first five months of the year, at the end of which time it was sold.

A portion of the city barn was remodelled into a garage, which was placed under the supervision of the street department. Instead of purchasing machines for those departments which would have use for them only a part of the time, it was decided to make a charge for such service in conformity with the figures prevailing in New Bedford for machines hired outside. The accompanying table sets forth the result of the experiment, which is regarded in every way as a success, and affords valuable data respecting the cost of machines in municipal service.

New Bedford is not the only city in the country to adopt this method of caring

stance in which cars equipped with the Knight sliding sleeve motor have been purchased for municipal service.

Two of these machines will be fitted, upon special order, as flying squadron cars for the two principal police stations. The three others will be equipped as roadsters and will do duty as battalion chief's cars in the fire fighting squad. Besides utilizing Knight engines, these chassis have Lanchester spring suspension, worm driven rear axles, etc. The motors have four-inch bore and 5.5-inch stroke, developing 40 to 45 horsepower, according to the maker's rating.



Three-Ton White Truck in Service with the Street Department in New Bedford, Mass.

STREET DEPARTMENT COSTS.

The annual report of the street department in Lynn, Mass., shows the cost of operating five trucks owned by that city. Of these, three were purchased during the past year, and the report shows the cost of the chassis. The body work was done by the street department in its repair shop, except for the Teel-Woodworth truck, the body for which was built at the factory.

This is a three-ton machine, having a 40 horsepower motor, and being fitted with a tank for street sprinkling. The Standard is also a three-ton, 40 horsepower machine, and this and the three-ton White chassis were fitted with dumping bodies. The Federal mentioned in the report has been in continuous service for 10 to 14 hours daily, almost without cessation for nearly two years. The figures include a new set of tires. The report follows:

	Cost	Body	Running Expense
White	\$3515	\$261.36	\$241.63
Teel-Woodworth	2750	78.57	240.12
Standard	2800	176.21	551.16
Repairs.			
Federal		\$413.16	\$722.33
Ford		427.14	440.30

FOR ASHES REMOVAL.

Acting in co-operation with the engineers of the New York City street cleaning department, the White Company, Cleveland, O., believes it has solved many of the difficulties attendant upon the removal of ashes and garbage by the installation of a new type of dumping body, built on an underslung frame. The body is 13 feet three inches long by seven feet six inches wide, and has a capacity of 252 cubic feet. The sides are made up of removable sections, which facilitate loading and make it unnecessary for the crew to lift refuse receptacles more than waist high. The top is completely covered by sectional doors, a feature of decided sanitary importance.

The truck is designed to be used for carrying all kinds of refuse, as well as for ashes and garbage. At the disposal plant or dump, the load is deposited at

any prescribed spot, the unloading being accomplished by a standard White dumping mechanism, placed out of the way horizontally along the frame. The contents of from 110 to 122 cans of ashes, the equivalent of five one-horse cart loads, can be carried by this machine at a time.

In the district where this truck is now working, the haul to the dumping place is three miles. The machine covers this distance in 14 minutes. One man drives and operates the dumping mechanism. If the truck travelled only as fast as a horse drawn wagon, it would be doing the work of five horse, five carts and five men, but it travels three or four times as fast, hence, it does the work of 15 to 20 one-horse carts.

MARTIN COMBINATION WAGON.

An accompanying illustration presents the Martin combination chemical engine and hose wagon, type B, made by the Martin Carriage Works, York, Penn. This is fitted with a four-cylinder, four-cycle, water-cooled, T head motor, with cylinders cast in pairs, and with bore of 4.25 inches and stroke of five. This gives a rating, under the S. A. E. formula, of 28.9 horsepower, but the maker claims it will develop 40 at 1600 revolutions a minute. Ignition is by high-tension magneto. Lubrication is by force feed.

The clutch is a multiple disc member, and the sliding gear transmission affords three forward speeds and reverse. Final drive is by side chain. Service brakes operate on the jackshaft, and the emergency, on rear wheel hubs. Springs are semi-elliptic front and rear. The wheels are of select second growth hickory, artillery hubs, with extra large flanges specially designed for fire department service. Tires are 36 by 3.5 inches in front and 36 by four in the rear. The wheelbase is 124 inches and the tread, 58 in front and 60 in the rear. The speed is 30 miles an hour, although this may be increased by the use of pneumatic tires.

The body is made of thoroughly seasoned lumber, properly ironed and braced. The capacity is 1000 feet of 2.5-inch double jacketed fire hose. The pilot seat is an attractive racy type, with ample arm room, and railings and fittings are in nickel or brass. The equipment includes: One thousand feet of 2.5-inch fire hose, two 35-gallon hammered copper tanks, 2000 feet of .75-inch four-ply chemical hose, shut-off nozzle, two acid receptacles, hose spanners, wrench, hose basket, two lanterns, alarm bell, one 20-foot rapid hoist extension ladder, one 12-foot roof ladder with patent folding hooks, two extinguishers, axe, 25 feet of rope, etc.



Type B Combination Chemical Engine and Hose Wagon, Made by Martin Carriage Works, York, Penn.

MOTOR VS. HORSE EQUIPMENT.

Officials of the fire department in New York City recently made public some very interesting figures, based upon their experience with motor driven apparatus and with horses. According to this authority tractors for engines and ladder trucks cost \$3750 each, and their life is 20 years. The annual cost of maintenance is: Depreciation, \$186; 100 gallons of gasoline, \$20; 10 gallons of lubricating oil, \$12.60; repairs, \$200—a total of \$418.60. Three horses, for the same purpose, cost \$350 each, or a total of \$1050, and the life of a horse in fire department service is seven years. The annual maintenance is given as: Depreciation, \$150; forage, veterinary services, shoeing, stable equipment, harnesses, etc., \$750—a total of \$900, which exceeds that of the tractors by \$481.40, or in 20 years, the life of the tractor, by \$9628.

The officials also state that the cost of a motor hose wagon is \$4045, and its life 20 years. Its annual maintenance is placed at: Depreciation, \$202.50; 100 gallons of gasoline, \$20; 10 gallons of lubricating oil, \$12.60; repairs, \$100—a total of \$335.10. Two horses, required for the same kind of apparatus, cost \$700, and their maintenance at \$250 each is \$500. Depreciation is placed at \$100. This gives a total of \$600, which exceeds the annual maintenance cost of the motor equipment by \$264.90.

It may be admitted that the figures for horses will vary materially in different localities, and that other cities will not experience the same results that appear to have been obtained in New York. However, it is possible to include some extra expense for repairs to the fire station, which can be charged directly to horses. And, of course, there is the additional question of the decreased room necessary when motor apparatus replaces horses, an item that comes very much into the consideration when new real estate is to be acquired or when a new building is being erected.

NEWS FROM VARIOUS CITIES.

For Spreading Hot Tar—White Company, Cleveland, O., announces sale of three five-ton trucks to Good Roads Company, a contracting firm in Baltimore, Md., for use in spreading hot tar and other road binding materials. The tank bodies will be built with a steam generator and a series of interior steam pipes for maintaining the tar at the proper state of fluidity, and the power transmission will operate an air compressor to force the fluid through the passages to the spreading outlet.

To Purchase Apparatus—Robert Boone of Asbury Park, N. J., has been appointed chairman of a committee representing the North Asbury Engine and Hose Company, to purchase automobile apparatus. This is to be similar to that now used by the Wesley

and Neptune companies, with electrical equipment, and small hose and air pressure tank, in addition to the regular hose supply.

Accepts Robinson Pump—The Independent Hose Company, Red Bank, N. J., has taken delivery of a Robinson triple combination pumping engine, made by the Robinson Fire Apparatus Manufacturing Company, St. Louis, Mo. According to the terms of the contract the machine was required to pump 800 gallons against 120 pounds net pump pressure; 300 gallons against 200 pounds, and 320 gallons against 250 pounds. The official test was made under the supervision of engineers representing the National Board of Fire Underwriters.

Detroit Buys a Paige—The police department in Detroit, Mich., has added another machine to its already extensive equipment, this being a 36 horsepower Paige Speedway model, made by the Paige-Detroit Motor Car Company of that city. An accompanying illustration shows Sergt. Staples, of the division which



Paige Speedway Model, Recently Acquired by the Detroit Police Department.

devotes its energies to regulating speed, seated in the new car. He formerly used a motorcycle.

Want Motor Patrol—The Ninth District Improvement Association and the Village Improvement Association of Melrose, in the town of Wakefield, Mass., are engaged in working up public sentiment in favor of purchasing a motor police patrol, capable of being converted readily into an efficient ambulance. It is pointed out that a town of that size, possessing no public hospital and no readily available ambulance, and containing numerous factories, should be equipped to handle cases of emergency or accident in the most efficient manner.

In the Market—The following cities are considering the purchase of motor fire apparatus: Fort Wayne, Ind., tractors; Nahant, Mass., pumping engine; Erie, Penn., aerial truck; Knoxville, Tenn., three pieces; Jamestown, N. Y., combination pump, chemical and hose car; Holland, Mich., combination chemical and hose wagon; Cornwall, N. Y.; Somerset, Penn.; Fullerton, Cal.; Watkins, N. Y.; Danbury, Conn.; Anacortes, Wash.; Avalon, N. J.; Waverly, N. Y.; Warren, Mass.; Watsonville, Cal.; McComb City, Miss.

NEWS FROM THE FOREIGN TRUCK FIELD.

French Army to Increase Its Tractor Equipment as Result of Recent Military Trials--Four-Wheel Drive Machine for German Government--Notes from Abroad.

AS A result of the recent French military trials, in which 13 four-wheel driven tractors competed with splendid success, it is a foregone conclusion that the army will largely increase the number of such vehicles employed, particularly in the artillery corps. The entire 13 machines, each of which hauled two trailers fully laden, completed the test without mechanical difficulty and in good condition. Two types of machines were tested, light vehicles hauling maximum loads of 13.5 tons, and heavy, hauling loads totalling 22.5 tons.

Four makes were represented: Panhard-Chatillon, Latil, Renault and Schneider. Two of the four Panhards were fitted with Knight engines. The machines left Rheims on a 600-mile trip over all sorts of roads, arriving in Paris at the end of two weeks. At no time did any of them receive outside help, and, although some often became embedded in mud or sand, they always were able to extricate themselves under their own power.

At the conclusion of the run the military jury decided to include a series of supplementary tests, dealing with hill climbing ability, the use of winches and capstans, brakes and the power of operating across country with thick mud prevailing. The first of these comprised climbing an 11 per cent. grade with an S turn in the middle. Tractors were required to go half-way up with two trailers, stop, unhitch the trailers for a brake test, and finally haul the trailers to the top by means of the capstan.

The result of the trailer brake test was uniformly unsatisfactory. When the 15-ton loads were left to themselves it was impossible to hold them on the hill with their own brakes. These were of the ordinary horse wagon type, brought into contact with the steel rim of the wheel by a screw or a lever. In every case the diameter of the shoes was found to be too small.

The supreme hill climb was on a 22 per cent. grade, with a right angle turn at the bottom. This was

climbed by the tractors only, with full load on their platforms, and all went up with comparative ease. Each machine was stopped in the middle for brake tests, and in every case it was possible to hold the tractor with two sets of brakes, but in some instances it was difficult to stop them when they were allowed to run backward. The Schneiders, with external wood blocks, were the only ones capable of stopping with one set of brakes.

Cross country tests were made on a military ground near Paris, where for nearly a month persistent rain had made conditions as difficult as could well be imagined. These trials had in view the efficacy of the various paddles and other appliances for working in mud. The Latils and one of the Panhards were equipped with a steel rim with deep projecting ribs bolted to the side of each wheel. Another Panhard made use of hard wood strips placed across the wheel at very frequent intervals and attached by chains going between the spokes. Still another Panhard device consisted of a ring of metal plates forming links and completely covering the rubber tires. An almost square block of wood was pivoted to each of these links, forming a series of wood paddles around the wheel. The Schneider machines were equipped with a pair of steel running boards, which could quickly be taken off and made use of to get over ditches and soft places. Heavy chains around the tires were utilized, except in the very worst spots.

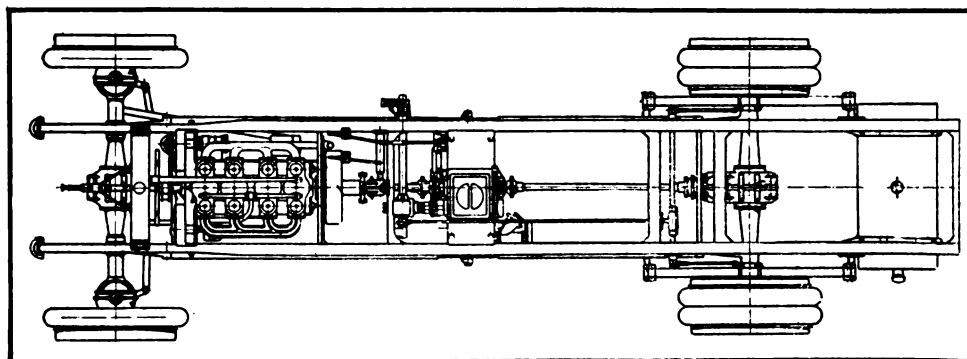
GERMAN FOUR-WHEEL DRIVE.

Accompanying sketches set forth the constructional details of the new Ehrhardt four-wheel drive wagon, recently supplied to the German military authorities by Heinrich Ehrhardt, Dusseldorf. The machines furnished were equipped with guns adapted to be fired at balloons, aeroplanes, etc.

The motor is a four-cylinder unit, with bore of 130

mm and stroke of 150 mm (5.1 by 5.9 inches), rated at 50 horsepower. The two central bearings of the crankschaft are carried in the upper half of the base chamber, while the two end bearings are divided, one part being supported in the top half and the other in the lower portion of the crank chamber.

The change speed gear, which is connected to the



Plan View of Ehrhardt Chassis, Recently Delivered to the German Military Officials.

engine through a leather faced cone clutch, is adapted to give four speeds forward and a reverse. There are three shafts in the gearbox, these all being located in same plane, one above the other. The sliding pinions are mounted on the top shaft, which is castelated for the purpose. The gears on the two lower shafts are constantly in mesh, the lowest carrying a differential gear, and also are provided with universal joints at each end, which transmit power through propeller shafts extending forward and backward to the front and rear axles, respectively, both of the last named being driven through bevel and differential gearing.

In the front, as well as in the back axles, the live shafts are enclosed in a casing. On the front axle, built up with the steering pivots, is a dust and grease tight casing which encloses a series of bevel pinions, enabling the drive to be transmitted to the front wheels at whatever position they may be turned under the action of the steering wheel.

The rear wheels, which are mounted on the axle casings, and receive their driving effort through dog clutches fitted to the ends of the axles, are of special type, built up of sheet steel discs and shod with twin solid rubber tires. On each side of the wheels extension rings are bolted, so that when the vehicle is travelling over soft ground, into which the tires may sink, there is a rim surface 15 inches wide, which assists in preventing the loss of traction.

CARRYING HORSES BY MOTOR.

Dissatisfied with the conditions under which his race horses were being carried from his training stables near Paris to the various race courses in England, Edmond Blanc has instituted, for their benefit, a special motor service between France and England. When sent by rail, race horses are often rendered nervous and are put out of condition to such an extent that they do not do justice to their trainer.

The new motor service consists of a Latil front drive chassis, to which a special form of horse box has been adapted. One chassis is kept in readiness at the training stations, and when the horse has been led into the van the latter is raised by a crane and deposited thereon. In a few minutes it is fastened down and it is quickly on the way to Boulogne. On arrival at this port the driver takes his vehicle to the quay, and the van is raised from the chassis and deposited on the deck of the steamer.

A similar Latil chassis is in waiting at Folkestone, the van is placed upon it and fastened securely, and the journey is continued to the course on which the horse is to make its public appearance. Thus, from the time the horse leaves the

French training ground until its arrival on the English turf, it is not taken out of its box. The actual journey, too, occupies slightly less time than by rail.

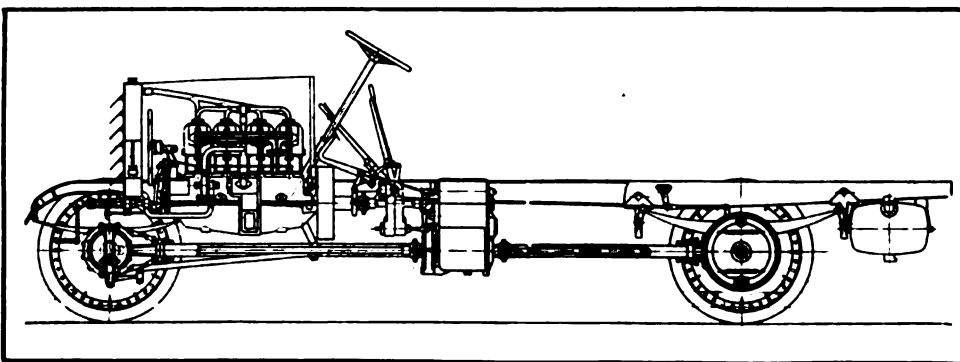
Everything possible is done for the comfort of the horse. The van is suitably padded, and in the fore portion there is a compartment for the trainer, who is also in communication with the driver. The vehicle is mounted on twin pneumatic tires front and rear. With the front drive system, as employed with the Latil, which is made in America by the Walter Motor Truck Company, New York City, there is no mechanism to the rear of the front axle, thus there is an entire absence of noise which might distress the animal.

BOHEMIAN MOTOR PLOW.

Leurin & Klement, Ltd., Jungbunzlau, Bohemia, Austria, somewhat well known in the industry through the manufacture of the Klement pleasure car, has produced a new motor plow, following closely, in general appearance, the Stock machine made in Germany. The engine is mounted in front on a long frame, which is carried on two large diameter driving wheels. Attached to the other end of this long balanced frame is the plow frame proper, carrying six shares, the rear being mounted on a special guide wheel.

The engine is rated at 80 horsepower, and is a four-cylinder unit, cast in pairs. Ignition is by Bosch high-tension magneto, and a motor starter is fitted. The clutch is a cone member, specially designed to provide easy engagement. The transmission affords three speeds forward and reverse, and is so arranged that it is impossible to change speeds without declutching. The three speeds are two, three and 3.75 miles an hour.

The large driving wheels are fitted with removable paddles, for affording traction in soft soil, and when these are detached, it is possible to operate the machine over ordinary roads without difficulty. Two men are required to operate the plow, one of whom faces forward at the steering wheel, while the other faces backward, being seated at a lower level, to manage the plow share frame. Both seats are located a short distance behind the driving wheels.



Side Elevation of Ehrhardt Four-Wheel Drive Chassis, Illustrating Relation of Components to Each Other.

WILLYS UTILITY ABROAD.

It is seldom indeed that British municipalities depart from what appears to be an unwritten law with respect to goods made in Great Britain. It is therefore somewhat surprising to learn that the police department in Leeds, England, has been using a specially equipped Willys Utility chassis, made by the Willys-Overland Company, Toledo, O., and with such success that English newspapers felt constrained to state that the men assigned to this vehicle were particularly efficient in the discharge of their duties.

The 16 policemen shown in an accompanying illustration composed a "flying squadron", assigned to special duty in Leeds during the recent industrial strike in that city and vicinity. For three weeks they were on duty night and day, ready for instant transportation to any quarter in which trouble might occur. Of course, the machine was subjected to the same requirements, and it was almost constantly employed in



Willys Utility Chassis Utilized by Flying Squadron of Police During Recent Strike Riots in Leeds, England.

rushing the officers from one part of the city to another. The success which attended the initial use of an American machine for such work is expected to result in increased business in this type of vehicle.

FOREIGN NEWS NOTES.

Market for Motor Omnibuses—Reports from Roumania state that there is a decidedly good market for motor omnibuses, which are wanted for developing business in many districts inadequately supplied with railway facilities.

Fire Apparatus for Russia—Russian municipalities are beginning to take interest in motor driven fire fighting apparatus, as evidenced by a recent order for two German machines given by the department in Kiev. Both are of the Bussing make, one a pumping engine capable of delivering 440 gallons a minute,

and the other an extension ladder, fitted with an electric motor designed to turn the ladder through 360 degrees when inclined at an angle of 65 degrees.

Austrian Import Figures—There was a large increase in the importation of foreign made commercial motor vehicles into Austria last year, the returns showing a total of some \$850,000 as compared with \$580,000 for the previous year. The largest number of machines imported were from Germany, with France, America, Great Britain and Belgium following in that order.

Agricultural Trials in Scotland—Regulations have been issued by John Stirton, secretary of the Highland and Agricultural Society, 3, George IV bridge, Edinburgh, Scotland, for the exhibition trials of motor agricultural implements, which will be held in that city some time this autumn. In order to secure entries from foreign countries, the society has decided to allow a sum equivalent to the freight and cartage from London to Edinburgh.

Adopts Easy Payment Plan—Another example of the methods adopted by British manufacturers of motor vehicles and their dealers to offset the effects of the so-called American invasion, is noted in the recent announcement of the Bentic Motor Supply Company, Manchester, England, that it is prepared to supply Belsize machines on easy payment terms. These include a deposit of 25 per cent. of the cost at the time of sale, and the remainder in monthly installments.

German Export Figures—According to the figures recently made public in Germany, the exportation of commercial motor vehicles during 1913 reached a valuation of some \$3,250,000 as compared with \$1,900,000 in 1912. Twenty-five per cent. of the machines were shipped to Russia, Brazil, Austria, Roumania, Turkey, Servia, Finland, Great Britain, Holland, Italy, Argentine, America and Switzerland following in that order.

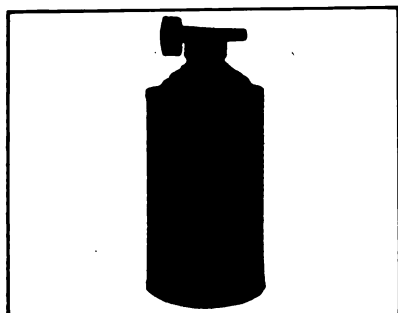
More Motor Mail Vans—The general postoffice surveyor for the northeast district in England is inviting tenders for the conveyance of mail in motor driven vans between Leeds and Boroughbridge, Yorkshire, for a period of three years. This is another step in extending this type of service in many sections of Great Britain.

Gramm in St. Petersburg—A contractor in St. Petersburg, Russia, is utilizing a Gramm truck, equipped with Firestone tires, in handling lumber and structural iron work between that city and Tsarskoe-Selo.

NEW COMMERCIAL CAR ACCESSORIES.

Carbonox.

Carbon is present in the cylinders of the internal combustion engine, the amount of the deposit depending upon



the grade of lubricant and the quantity utilized. Formerly it was deemed necessary to dismantle the motor to remove it, but in these days it can be displaced easily. The Northwestern Chemical Company, Marietta, O., has been marketing for some time a carbon remover called Carbonox, a fluid, which is injected into the cylinders. The preparation does not dissolve the carbon, but attacks the charred oil that fastens the flakes of carbon to each other and to the cylinder, piston head, etc.

The method of use is simple. Carbonox comes in a can having a detachable spout and by means of the latter the fluid is injected through the spark plug opening. The result is that the carbon is loosened and is blown out in the exhaust. The amount present may be noted by holding a sheet of paper under the outlet. One of the qualities of Carbonox is that it provides an inexpensive method of keeping the cylinders free from carbon, as the cost a cylinder is but a few cents.

Knopf Recorder.

The Knopf Bros. Manufacturing Company, Inc., 2071 Seventh Avenue, New York City, has brought out a new type of mileage recording instrument, the operating mechanism of which is contained within a case which is attached to the wheel by several screws entering the spokes or hub flanges. The screw heads, however, are inside the case, which is provided with a lock.

The mechanism is suspended inside by ball bearings with a weight to maintain it in its proper position. The odometer is operated by a cam located inside the case, which strikes a roller once during each revolution of the road wheel, actuating an arm which moves a ratchet wheel one notch. The odometer registers to 10,000 miles and repeats, but it cannot be set back without completely disassembling.

A cylinder in the upper end of the odometer rotates once for each mile travelled by the car, causing an arm to oscillate with a slow, continuous motion, once for each mile. The arm carries at its upper end a stylus, which produces a record on a tape as it is drawn out from a little round box at the top.



At the right of the weight is a clock which will run for 36 hours on one winding. It is geared to a large drum surrounding the central wall of the instrument, upon which the tape is wound at such speed that the stylus comes opposite the hour marks at the proper time. The tape is sensitized so that the pressure of the metallic stylus traces a line upon it, and it is graduated into three-minute periods, two inches being allowed for each hour. The recorder registers starting, stopping and operation of the vehicle, as well as the rate of speed, and they are outlined on tape.

Farnsworth Generator.

The Farnsworth gas generator, marketed by the Distillate Motor Equipment Company, San Francisco, Cal., makes possible, it is claimed, the operation of a motor car with kerosene, distillate and other low grade fuels. The exhaust gas is utilized for raising the temperature of the fuel, and the generator shown in

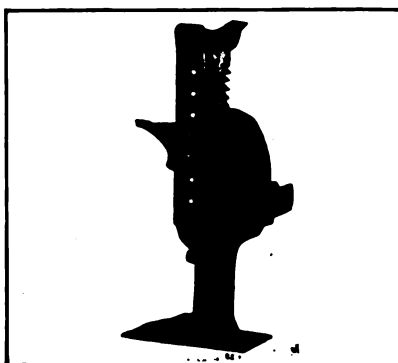


the accompanying illustration is attached to the carburetor in such manner that the exhaust taken from the exhaust manifold is passed around the chamber of the device. The generator itself is cylindrical in form.

It is stated that tests made with the device resulted in a great saving of gasoline, and that considerably more energy was developed by the motor. Similarly, it is claimed that the mileage a gallon was increased, it being 12.6 miles without the generator and 15.3 with the apparatus installed on a standard make of pleasure car.

Barrett Jack.

The Duff Manufacturing Company, maker of the Barrett automobile jacks, has brought out a new design, termed



the 1914. One of the qualities of the new jack is the casting integral with the malleable iron top, an adjustable lifting member, which is of advantage in that it permits using the jack where the height is less than the maximum of the regular top. The smaller top member slides and is secured by bolts. This construction adapts the jack to all types of machines.

The pawl points are machined all around, meshing perfectly, making for a large factor of safety, efficiency and convenience.

J. & B. Fuel Saver.

As the efficiency of the motor largely depends upon the correct proportions of fuel and air, a number of devices for regulating the supply of air from the

seat have made their appearance during the past year. The principle involved is that of admitting atmosphere when it is supposed that too large a quantity of



gasoline is emerging from the jet of the carburetor, and when the motor is attaining high speeds.

The majority of the devices marketed provide for manual control; that is, the operator of the car utilizes his judgment as to the amount of air required. The device manufactured by Jones & Buckoke, 1413 Michigan Avenue, Chicago, differs from conventional practise in that the air is admitted automatically and according to the speed of the engine.

The J. & B. automatic fuel saver is located on the dash and is connected by a flexible tube to the intake manifold between the carburetor and the cylinders. The dash device contains an air valve, which opens and closes according to the varying suction which changes with the speed of the engine.

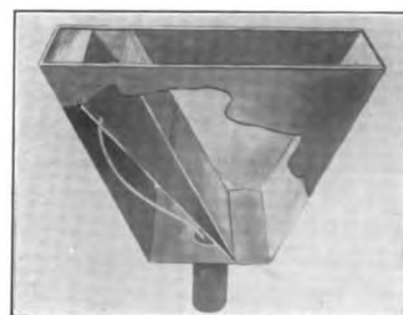
When the motor is running slowly the valve is closed, but as the speed picks up, a valve member is automatically released from its seat, and allows air to be drawn into the intake manifold, the extra atmosphere being in proportion to the requirements of the engine.

No-Shammy Funnel.

The No-Shammy funnel is manufactured by the No-Shammy Products Company, Cleveland, O., and is marketed by Chas. E. Miller, 97-103 Reade Street, New York City. One of the qualities of the design is that the gasoline will flow as readily as through an ordinary funnel not equipped with a screen or filtering means. With the No-Shammy the fuel passes through quickly, while all water and foreign elements are trapped.

The principle of operation is the difference between the specific gravity of gasoline and water. When the fuel is poured into the funnel, any water and heavy sediment in it immediately settles to the bottom of the funnel, while the gasoline floats off through a gauze member. The particles of dirt held in suspension are prevented by the gauze from passing over.

It is pointed out that water can rise to the top of the funnel, as the film of gasoline over the gauze prevents it passing through. This is secured by scientific determination of the angles of the walls, position and mesh of the gauze, etc. The No-Shammy funnel is inexpensive, and sturdily constructed.



QUALITIES OF DIESEL OIL ENGINES.

IT IS held by many that the fuel problem would be largely overcome if the Diesel engine could be produced in small sizes suitable for service with the commercial vehicle, on account of the ability of this engine to utilize heavy grades of fuel. The advantages of the type are: The ability to use cheap and easily obtained fuels, economy of operation and the elimination of the carburetor and magneto. Some of the disadvantages of the Diesel engine are: High cylinder

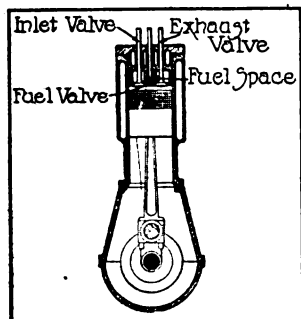


Fig. 1—Sectional Diagram of Diesel Engine.

pressures necessitating great strength and weight, lack of flexibility, difficulty in starting and accurate measurement of the fuel.

Eric Walford, an English engineer, holds that the difficulties standing in the way of the development of the Diesel engine for commercial vehicles are mostly practical ones, and states that when the extraordinary advance that has been made in the construction of ordinary automobile motors is considered, the future seems hopeful. By the use of chrome and vanadium steels it would seem possible to make the parts of the required strength with comparatively low weight, rendering the engine practical for commercial vehicle use.

It is suggested that the pressure might be further lowered by heating the air so that the compression would not have to be so high to obtain the necessary ignition temperature. The lack of flexibility might be overcome by combining with the engine a simple form of electric transmission system, and the transmission itself might provide an electric starter.

The method of operation of the Diesel engine will be of interest to those not familiar with the design, and it will also serve to make clear the disadvantages as well as advantages above referred to. The drawing at Fig. 1 will be of service, but the illustration is merely diagrammatic, representing the chief essential features.

Operation of Diesel Engine.

It will be noted that the compression space is extremely small, and that, between the two main valves, the inlet and the exhaust, is arranged a fuel valve. Driven by the engine is a pump which supplies air to an air cylinder. The engine illustrated operates on the four-cycle principle, but the Diesel principle can be applied to two-stroke cycle engines also. It is assumed that the engine has exhausted gas through the exhaust valve in the ordinary way and that the piston is about to descend. The inlet valve in the cylinder head is then opened and air alone, usually at atmospheric pressure, is drawn into the cylinders. (Sometimes this air is at a pressure above that of the atmos-

phere.) On the upstroke of the piston this air is compressed until, at the top dead centre, the pressure is about 500 pounds to the square inch. (In the ordinary motor car gasoline engine the pressure rarely exceeds 75 pounds the square inch.)

At the top dead centre the central or fuel valve opens, admitting fuel and compressed air. Prior to this the space around the fuel valve has had supplied to it a small quantity of oil which forms the fuel. Directly the fuel valve opens, air, compressed to a pressure of more than 500 pounds a square inch, is admitted through the fuel space and the now open fuel valve, injecting the oil from the fuel space into the combustion chamber in the form of a spray.

Compression Temperature.

The air in the combustion chamber being at a pressure of about 500 pounds to the square inch, the consequent temperature is sufficient to produce ignition. The oil as it enters the combustion chamber therefore burns, and this combustion is maintained throughout a varying portion of the power stroke, say the first quarter, when the engine is running at full load. The supply of fuel and extra air is terminated by the closing of the fuel valve. The piston, therefore, descends under the pressure of the combustion above it, until towards the end of the stroke the exhaust valve opens as usual, and on the upstroke the products of combustion are exhausted. The same sequence is then repeated.

A small pump arranged at the side of the engine maintains the supply of compressed air necessary for injecting the fuel, and compressed air is also as a rule used for starting the engine, but the mechanism employed is omitted from the drawing to simplify it.

Fuels Available.

From the high temperature of the air in the combustion chamber it is clear that almost any finely divided fuel will be ignited. In addition to petroleum oils, creosote and tar oils can be obtained in practically any country, and it has been suggested that coal dust could be employed, and, theoretically, there is no doubt it could, but the practical difficulties are so great that experiments with this fuel have never proved a success. The fuels that can be utilized are all extremely cheap in themselves, and, furthermore, this engine does more work to a gallon

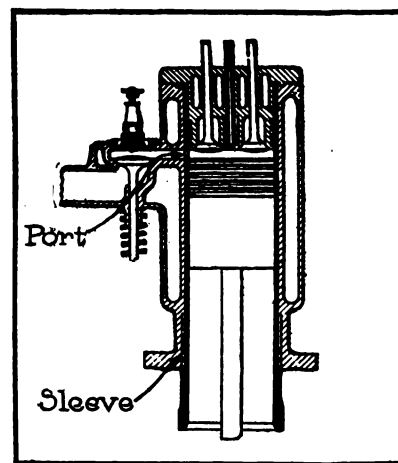


Fig. 2—Okill's Starting System for Diesel Engine.

never proved a success. The fuels that can be utilized are all extremely cheap in themselves, and, furthermore, this engine does more work to a gallon

of fuel than does the ordinary gasoline, kerosene or gas engine, so that the economy of running is still further increased. Carburetor and magneto troubles are non-existent, but in place of these there are the air pump and the air bottle.

Limiting Factors.

It will be readily understood that the pressures in the cylinders are extremely high, with the result that the cylinders and all moving parts must be correspondingly strong. This means great weight, and the weight of the reciprocating parts assists in limiting the speed of the engine, although there are more important limiting factors. Similarly, the engine will not run very slowly, so that the range of speed is very small. This certainly applied to the first gasoline engines, but everybody will agree that the modern automobile engine will operate at a sufficiently wide variation of speed, so that there is hope that the same improvement may be effected in the Diesel engine. To raise a compression of 500 pounds to the square inch it is clear that hand starting is impossible, but manual starting has been replaced on the motor car by the electric and other forms. However, considerably more power would be required to start a Diesel engine than an ordinary motor of the same size.

Starting Method.

The more recently patented arrangement shown at Fig. 2 is interesting as suggesting one method of overcoming this difficulty. Here the engine operates on the ordinary Diesel principle, but when the sleeve between the piston and cylinder walls is lowered, a port in the left hand side of it is brought opposite the combustion chamber, putting this in communication with a valve pocket. By this means the combustion space is considerably enlarged, so that the compression normally used on gasoline engines can be obtained. This valve pocket contains a spark plug and an inlet valve from which gas can be drawn from an ordinary gasoline carburetor. With the sleeve in the operating position the engine can work on the ordinary Otto cycle, using gasoline vapor. Directly it is well started the sleeve can be raised so as to cut off the valve pocket, allowing the engine to operate on the Diesel principle.

Varying Speed.

Accurate measurement of the fuel supply is of very great importance, and the power is varied by varying the period during which injection of the fuel occurs. The quantity of fuel supplied at each stroke is small even with comparatively large stationary engines. With an engine of four-inch bore and five-inch stroke, assuming the fuel pump to be five mm diameter, a stroke of only 3.1 mm would be required when the engine is running under full load, and under light loads the stroke would be only about three-quarters of a millimeter. This shows that the ordinary fuel feeding system would have to be considerably modified.

It is not suggested that attempts have not been made to use Diesel engines for motor car work, as Dr. Diesel himself co-operated with Sulzer Bros., Zurich,

in experimenting with a Diesel car, but without practical success. The work is now in the hands of the Delaunay-Belleville Company, in Paris, and before the late Dr. Diesel died he expressed great hopes for the future of his device in automobile development, and anticipated seeing a Diesel car in which all minor operations, such as gear changing, brake application, etc., were effected pneumatically. It is stated that this concern expects to have a car fitted with a Diesel engine on the road in the near future.

Factor of Fuel Supply.

As the pressures inside the cylinder are so extremely high, much difficulty is experienced in preventing leakage. This would be increasingly difficult in small engines in the hands of unskilled operators. The chief difficulty standing in the way of the adoption of the Diesel engine for motor car work is in measuring accurately the very small quantity of fuel required and varying the supply as the call for power varies. A variable delivery pump is an easy matter to design, but it is very difficult to make such a pump supply a minute quantity of liquid.

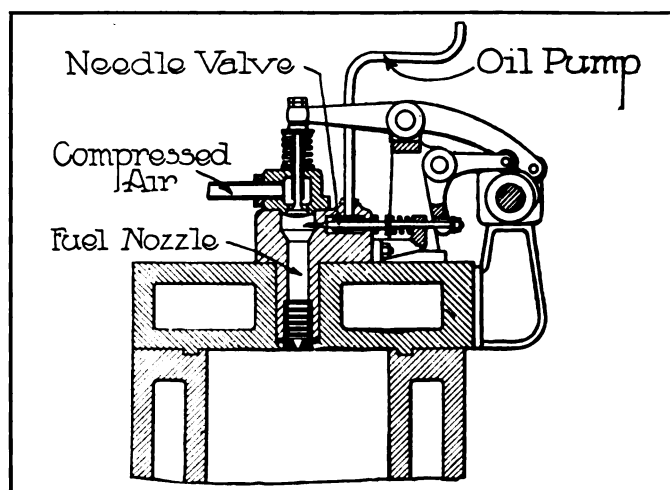


Fig. 3—Suggested Method of Fuel Feed for Diesel Engines Which Might Be Adapted to Automobiles.

The application of the Diesel engine to motor cars is dealt with at some length in a German magazine, *Allgemeine Automobil Zeitung*, of December, 1912. One method of overcoming the difficulty described therein is shown in Fig. 3, which depicts part of a cylinder head with a central fuel nozzle, which is of the open type. Just prior to the compression stroke the needle valve opens and a small quantity of fuel, under gravity or slight pressure, is caused to enter the open nozzle, the quantity admitted being determined by the period of opening of the needle valve. The nozzle contains perforated discs which impose a tortuous path on the fuel so that it does not enter the cylinder during the compression stroke. At the end of the compression stroke the air valve opens and compressed air scavenges the nozzle, blowing the finely divided fuel into the combustion chamber. In this case a single and comparatively large fuel pump for a number of cylinders is used, and the amount supplied is controlled by varying the movement of the needle of each cylinder.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

LEAK-PROOF piston rings are marketed by the McQuay-Norris Manufacturing Company, St. Louis, Mo. The construction of these rings is a radical departure



Leak-Proof Piston Ring.

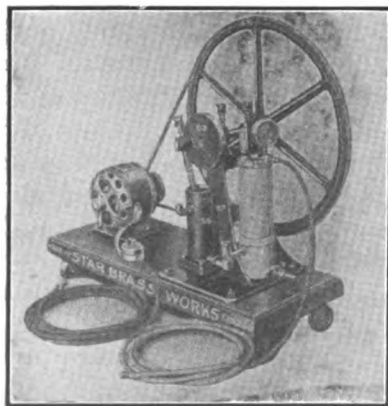
from conventional practise, as will be noted by an accompanying illustration being made in two pieces, and on the angle iron principle. Consequently there are no unsealed openings, as the flange of each section completely seals the opening of the other, thus obtaining the desired gas tight construction which makes for perfect compression.

They are made concentric instead of eccentric, and one of the qualities of the design is their equal tension on the cylinder walls. As the openings are diametrically opposite it is obvious that the tension is evenly distributed.

The Leak-Proof rings are in service in a large number of motors where trouble has been experienced by oil working up past the original members, and they are held to be decidedly efficient where imperfect compression has been experienced. The McQuay-Norris Company is issuing a booklet on piston rings, etc., which contains much valuable and instructive data upon the subject. The brochure will be mailed free upon addressing department D of the company.

BINKS ELECTRIC TIRE PUMP.

The Star Brass Works, 319 North Albany avenue, Chicago, is manufacturing the Binks electric tire pump shown in an accompanying illustration, and efficiency is one of its features. The equipment is most complete and includes suitable length of hose, flexible lamp cord, etc. The compressor is constructed of the best grade of iron, neatly enamelled. The cylinder has a bore of two inches and a stroke of five, and is bored and ground to exact dimensions. The piston rings are of



Binks Electric Tire Pump.

the same material as the cylinder and as carefully finished and fitted. All parts subject to friction are equipped with spring grease cups. The valves are of special design and material and, it is stated, will require no attention.

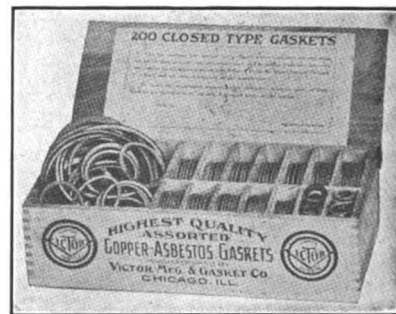
The compressor is operated by a .25

horsepower 110-volt direct or alternating current motor (60 cycles), and 15 feet of lamp cord with socket is included in equipment. Lubricant is prevented from reaching tires by a well designed oil extractor located between the pump and the hose. The relief valve may be set to any desired pressure, preventing over inflation or the bursting of tires. The outfit is mounted on a finished, painted platform two by 12 by 30 inches, and swivelling ball bearing casters make it an easy matter to move the equipment.

The Binks electric tire pump is constructed to withstand severe service and is liberally guaranteed by a maker having 14 years' experience in the production of pumps. Price lists and descriptive matter will be supplied upon request.

VICTOR ASSORTED GASKETS.

The Victor Manufacturing & Gasket Company, Troy and 21st street, Chicago, in addition to marketing its regular line of copper asbestos gaskets, is producing them in assorted sizes packed in boxes. Four different boxes are offered the trade. Box No. 1 contains 12 complete sets of gaskets for the Ford car, these comprising that for the cylinder head, intake and exhaust, etc. Box No. 2 contains 200 assorted copper asbestos gaskets selected from the most popular sizes universally used, and in proper proportion for everyday repairs on all makes of cars. The assortment is augmented by 65 selective sizes of gaskets to fit all makes of spark plugs marketed.



Victor Assorted Gaskets.

Box No. 3 has 50 assorted gaskets constructed especially for the intake and exhaust pipes and manifolds, exhaust flanges, carburetor connections, etc. There are 25 different sizes to choose from, making the equipment a valuable one to the repairman. Box No. 4 contains 100 assorted French type gaskets. All assortments are placed in a neat wooden box with steel hinge cover and the different sizes, etc., are located in compartments. Slips accompanying the boxes give the location and sizes. The trade prices will be forwarded upon request, also a catalogue.

MOSSBERG SOCKET BRACE.

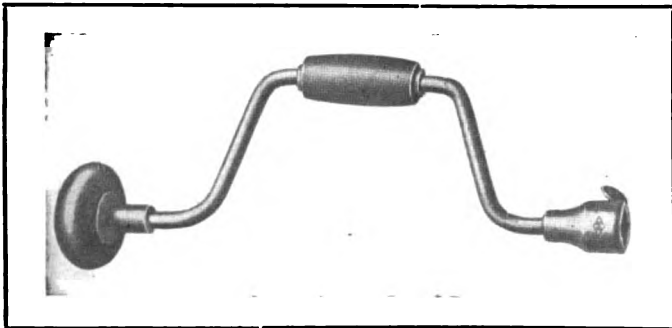
The Frank Mossberg Company, Attleboro, Mass., is manufacturing the Mossberg socket brace No. 360, shown in an accompanying illustration. A brace is a

decidedly handy tool in the repair shop and service station and may be employed for a number of useful purposes, such as grinding in valves, removing the nuts of demountable rims, working about the power plant, etc.

The Mossberg brace is very efficient, being constructed of the finest grade of steel, dull nickel plated and with ebonized wood handle. It is 13 inches over all and is covered by the usual Mossberg guarantee. The chuck end of this brace holds all sizes of Mossberg sockets and those having a standard shank. The brace is moderately priced.

The company makes a specialty of pressed steel sockets, some of which are shown herewith. The product of the concern is well and favorably known among repairmen and the trade, as the sockets are constructed of pressed steel and hardened, and by their mottled finish. They fit hexagon and square nuts, set screws, and bolt heads. One of their qualities is that they are standard and will fit practically every socket set that is now on the market.

They are produced for U. S. standard hexagonal nuts and bolts, A. L. A. M. standard hexagonal nuts and screws, manufacturers' standard hexagonal head-



Mossberg Socket Brace No. 360.

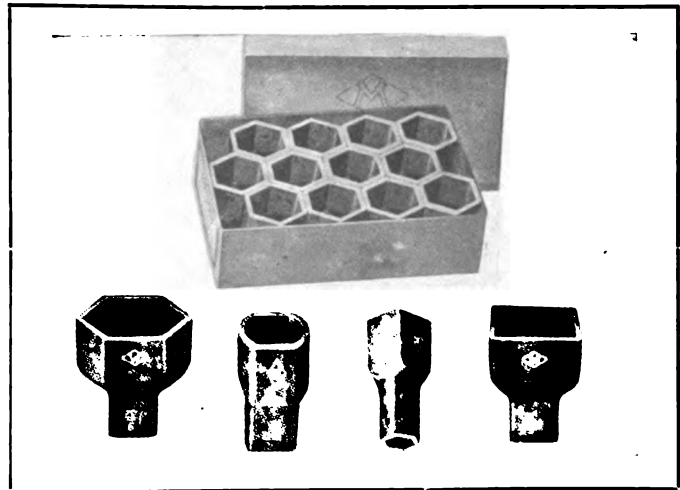
ed bolts and for cap and coach screws. The maker calls special attention to the necessity when specifying, that dimensions of nuts should be given measured "across the flats", or, in other words, the smallest diameter of the nut or bolt head, and, unless the actual size of the socket is ordered, an allowance is made by the company of .03125 inch for clearance. The Mossberg sockets are marketed in attractive boxes, each containing one dozen. Prices and complete list of sizes will be mailed upon request. The catalogue issued by the company is most complete.

COWAN TRANSVEYOR.

The Cowan Truck Company, Holyoke, Mass., is manufacturing the Cowan transveyor, shown in an accompanying illustration, which is produced in four sizes, having capacities of 2000, 2500, 3000 and 3500 pounds respectively. One of the qualities of the truck is that it is an all-metal construction. It is designed to operate over rough floors, up and down inclines and with the platforms is held to save considerable time and labor in the transportation of material about the factory. It is pointed out by the maker that fully 75

per cent. can be saved in the ordinary factory equipment.

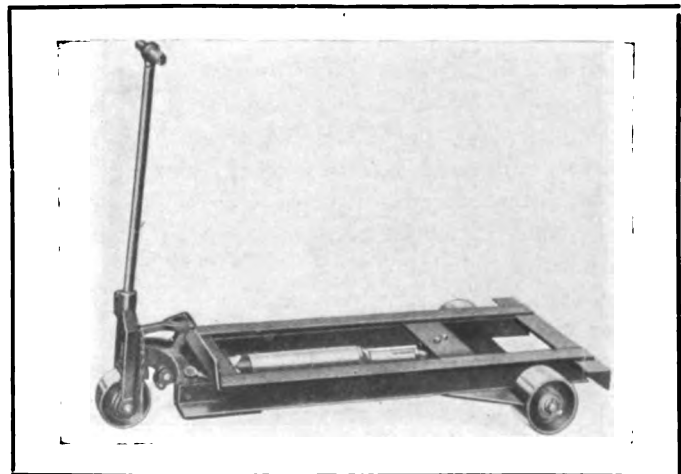
One of the features of the transveyor is its ample



Mossberg Pressed Steel Sockets and Container.

clearance when the platform is elevated, this being 2.75 inches. The type H transveyor is equipped with a specially designed hydraulic ram, and a few strokes of the handle will elevate maximum loads to a height of three inches, a clearance eliminating possibility of skids catching or encountering obstructions at the foot or top of inclines. It is stated that there is no possibility of the load being released until the operator presses a pedal, when the platform will slowly sink to the floor without shock or jar.

The front wheel of the all-steel construction is fully swivelled, making it possible to turn the machine in its length. The high grade ball bearings are protected by washers and dust caps, and the steering handle is at all times free, enabling the workman to guide the machine easily and accurately. The design of the handle is such that a straight pull is provided when removing the transveyor from beneath a platform. The wheels are six inches in diameter for the No. 1 and 2 types and seven for the others. The type H will be supplied with 10-inch wheels if desired. Special

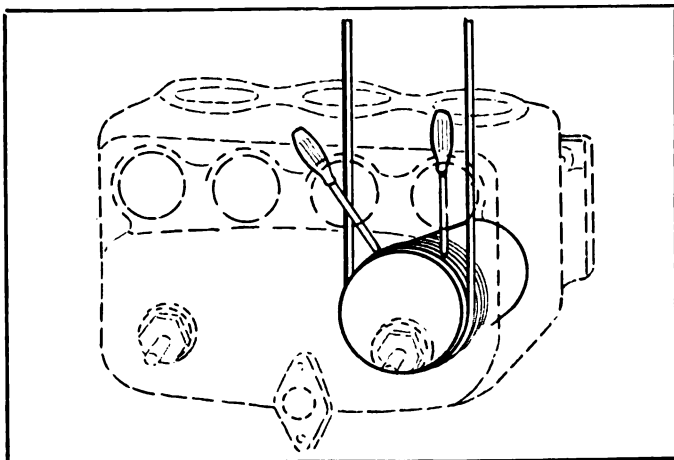


Cowan Transveyor, Which Is Utilized with Special Platforms.

cifications, dimensions and prices will be forwarded upon request. John Cronin, 118 Pearl street, Boston, is agent for the Cowan Truck Company.

HINTS FOR PROPER MAINTENANCE.

THE removal and replacement of the pistons with their rings from a cylinder is not a troublesome task if the work is performed properly, but if the pis-



Utilizing Metal Band to Compress Ring When Piston Head Slipped into Combustion Chamber, Preventing Removal from Cylinder.

tons and rods are inserted in the cylinder before the latter is replaced on the crankcase, care should be taken to prevent the piston rings from expanding in the combustion chamber.

An instance of this kind was noted by the writer recently, and although the machine was a pleasure car, the method utilized to correct the trouble is applicable to commercial vehicle engines. The cylinders were cast in pairs, and a new unit had been ordered from the factory. Due either to carelessness at the factory or to the pistons moving in transit, both slipped upward until their heads came in contact with the top wall of the combustion chamber. Naturally, the top ring expanded and when an attempt was made to remove the pistons it was found that the ring had caught.

Owing to the limited space it was found impossible to insert any type of clamp to compress the ring, although several different methods and kinds of material were employed. The owner was advised by the foreman of a large garage to utilize piano wire, inserting it through the valve plug openings and passing it under and around the piston and ring. This method had been employed by the expert, who stated that sometimes it required considerable time to so locate the wire that it would compress the ring diametrically opposite the slot.

The owner, after repeated trials with the wire gave it up, as it was found that the wire either slipped when tightened or became lodged between the ring and the chamfer in the cylinder. The problem was finally solved as shown in an accompanying illustration. By making a thin strip of metal of approximately the same width as the piston ring and passing it through the valve plug openings, it was a simple matter to locate the band in the desired position; that is, diametrically opposite the slot. One person drew the band

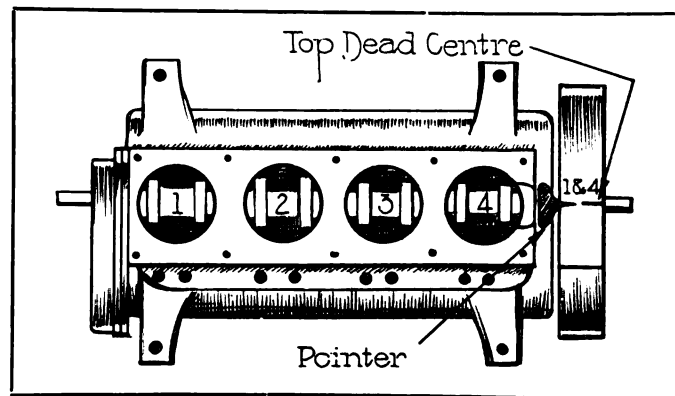
taut and exerted an upward pull which forced the ring on its seat or groove in the piston. Another person utilized a pair of screw drivers, compressing the ring at the points indicated in the drawing. With the band and screw drivers, a three-point compressional effect was obtained, and it was a simple matter to withdraw the piston back into the cylinder proper. The other cylinder was treated in a like manner and the entire operation consumed but a few minutes. Before beginning the work the ring was turned so that the slot was on top, or between the screw driver points.

TIMING OVERHEAD VALVES.

The opening and closing of the various valves of an internal combustion engine have much to do with its balancing, and often excessive vibration of the power plant is due to a variance in the opening and closing points of the valves.

A method of timing the overhead or rocker type is suggested by a repairman, and it includes the disassembling of the motor and utilizing the crankshaft, flywheel and upper half of the crankcase. The last named is placed on a level surface and sufficiently high to clear the flywheel, as shown in an accompanying illustration. The crankshaft is then rotated until the crankthrows of the first and fourth cylinders are exactly on top dead centre. This position is obtained by means of a square held to the side of the crank web and a spirit level placed on the top of the blade. Having obtained this position, a pointer, constructed of a piece of tin, is placed on the centre of the crankcase as shown, and so located that its point will overlap the flywheel. A line is then scribed on the flywheel, which indicates top dead centre.

The flywheel is then rotated a half turn, or until the throws of the second and third cylinders are on top, and the exact vertical position is obtained by means of the square and the level. The flywheel is also marked. The cylinders are next replaced and the



Timing Motor with Overhead or Rocker Type Valves by Utilizing Crankthrows.

other parts of the motor are then reassembled.

The crankshaft is then rotated until the exhaust valve of the No. 1 cylinder closes. This should take

place shortly after dead centre. A chalk mark is then placed on the flywheel opposite the pointer, and the flywheel turned until the No. 4 exhaust closes, when the flywheel should again be marked where the pointer overlaps.

Any difference between the timing of the No. 1 and No. 4 markings, with relation to the pointer, can be altered by turning the camshaft backward or forward one or two teeth as required. The No. 1 and No. 4 intake valves are treated in a similar manner, and with a little adjustment of the tappets the intake valves referred to will fall in with the correct timing of the motor. The position of the valves should be taken both open and closed.

SPLICING CABLES.

If it becomes necessary to splice a high-tension cable, the wire of each section should be bared sufficiently to permit of making a good twist of the ends. The part is next soldered. As the high-tension current will take the path having the least resistance, the bare wire can be protected by covering it with some form of plastic tire cement, then wrapping the part with friction tape.

CARE OF MAGNETO TERMINALS.

To obtain maximum efficiency from the magneto its terminals and those of the transformer coil must be kept clean and tight. With the type of instrument providing dual ignition the battery current is carried to the breaker box, where it is interrupted by the breaker mechanism, although there are exceptions as in the Simms magneto for example.

If the leads to the breaker box are loose considerable trouble may be experienced in starting on the batteries. If oil or grease has accumulated around the terminals, remove the wire, etc., and clean with gasoline, noting if any of the strands of wire are loose. All wires should be soldered to the terminals and the latter so placed that there is no opportunity for them to come in contact with the metal of the breaker housing. The writer noted a case recently where a driver was delayed over two hours trying to start the motor. The trouble proved to be a defective connection at the breaker box.

DETERMINING STEEL.

A method of determining self-hardening steel from ordinary cast steel is to hold the metal against a high speed emery wheel. If the color of the spark given off be bright red, it can be taken for granted that the material being ground is cast steel. If it is a dull red, however, the steel is of the self-hardening brand, and the sparks made are very much like those given off from cast iron.

HYRAY-EXIDE LIGHTING PLANTS.

The Electric Storage Battery Company, Philadelphia, Penn., has begun the commercial production of what are designed as the "Hyray-Exide" battery and switchboard units for small electric lighting plants, with a view of meeting the requirements of those who are remote from central stations and wish to make their own light. The outfits are designed to utilize any available form of generating power and to create current, storing it in a battery, from which it is supplied to lamps as desired.

On a platform built on skids is constructed a tray in which the battery is placed, and in front of this tray is a low voltage switchboard, mounted on a standard. The legs of the stand for the switchboard are jointed, so that by releasing the two rear stay rods the board may be lowered to about 40 per cent. of its full height. The board is lowered for transportation.

The switchboard includes a generator switch and fuses, battery switch and fuses, an automatic cut-out and cut-in switch, a pilot light, and an ampere meter and an ampere-hour meter. To this a generator field rheostat may be added at the option of the purchaser. When charging is done while the battery is used for lighting a single-pole, double-throw switch is installed, this being necessary with either resistance cells in the lighting circuit or with the reduction of the number of cells during the charge. This switch is installed when desired.

The battery consists of 16 "Hyray-Exide" cells, these having a rating of 32 volts. These are supplied in three sizes of cell, the batteries being 44, 78 and 117 ampere-hours capacity. Beneath the switchboard is a sufficient space to locate a generator, and this can be operated by any power that is constant. A small gasoline or oil engine, or water power may be used. With the generator on the platform connection may be made with a belt and the plant is in readiness for use. These plants are particularly suited for garages, especially those where power is used during the day, which may be utilized for charging, and can be installed in small shops, residences, or wherever the battery can be charged. The plant is set up at the factory, aside from installing the generator, and with the battery and switchboard as a unit can be handled very quickly and conveniently.

The Dauch Manufacturing Company has been organized at Sandusky, O., by Daniel E. Storms, R. D. Mitchell, J. A. Giedeman and Charles Dick, with capital of \$800,000. The company has acquired the plant of the Sandusky Auto Parts & Motor Truck Company and will engage in the manufacture of power wagons and trucks.

At Jersey City, N. J., the Motor Tire Reconstruction Company has been incorporated by C. N. King, W. L. Steck and G. H. Russell, with capital of \$250,000, to engage in the production of motor vehicle tires.

CORRESPONDENCE WITH THE READER.

Timing Diagrams—J. W. E., Schenectady, N. Y.

Will you explain the use of motor timing diagrams? There is one in the book of instructions that came with our truck.

The timing diagram referred to is determined by the designer of the motor and the opening and closing points of the plan are such as to obtain the maximum energy of the motor. These diagrams are utilized by the workmen in the factory to set the valves when assembling the motor, and also to enable the repairman to set the valves correctly in the overhaul of the power plant.

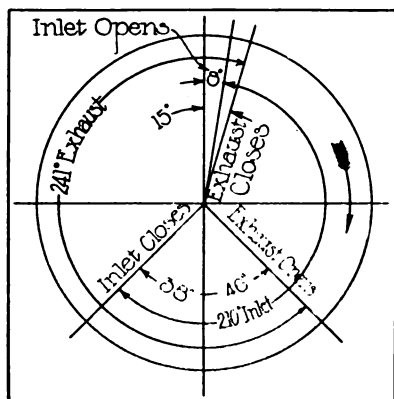


Fig. 1—Timing Diagram.

The majority of manufacturers mark the periphery of the flywheel with steel stencil letters, and these are utilized with reference to an indicator or pointer attached to crankcase or some part of engine. If the valve timing is correct, that is, the same as when the motor left the factory, the opening and closing points, and centres, represented by the flywheel marks, will register with the pointer above referred to.

The flywheel of a motor timed according to the diagram shown at Fig. 1 would bear the following marks: 1-4 Up, 2-3 Up, 1-4 I-O, 1-4 I-C, 1-4 E-O, 1-4 E-C, 2-3 I-O, 2-3 I-C, 2-3 E-O, 2-3 E-C. The marks 1-4, or sometimes marked D-C or C, refer to positions of the pistons or crankthrows as being on top dead centre; I-O and I-C, the opening and closing points of the intake valves, and E-O and E-C, the opening and closing points of the exhaust members.

Referring once more to the diagram at Fig. 1, it will be seen that the circumference of the flywheel is laid off into degrees, also that the dead centres are indicated by a vertical line. With the diameter of the flywheel known it is a simple matter to figure out and lay off the degrees, but as this is generally done at the factory it will not be necessary in retiming valves of the average motor.

It will be noted that the inlet opens eight degrees after dead centre and this corresponds to the flywheel marks I-O 1 or 4. The intake remains open until the piston has completed the suction stroke and has begun the compression stroke, or the valve closes 38 degrees after lower dead centre. It will be noted that the valve remains open 210 degrees.

The exhaust valve opens 46 degrees below lower dead centre, remains open 241 degrees, and closes 15 degrees after top dead centre. If it be borne in mind that one complete revolution of the flywheel equals 360 degrees and that 180 represents the complete movement or stroke of a piston, the application of the

diagram will be more easily understood in respect to the opening and closing points of the valves.

To check the timing of valves on a motor that has seen considerable service, the flywheel is rotated in its usual direction until the mark 1-4 I-O registers with the pointer or indicator. In this position the intake valve of the first or fourth cylinder should start to lift. If not the tappet adjustment should be altered. The timing diagram is also useful when replacing an unmarked camshaft. The teeth of the latter are so meshed with the crankshaft gear that the cam of the intake valve of the No. 1 cylinder, for example, begins to lift the valve stem.

Dish of Wheels—E. J. K., Glenbrook, Conn.

Why is it that the front wheels of machines are closer together at the front and the bottom?

Some manufacturers dish the front wheels and toe them in at the front slightly. The amount of divergence from vertical is termed the camber and involves a mechanical principle—that the nearer to an alignment the centre of the spindle bolt and the pivot of the wheel are when turning, the easier the car will steer.

The gather of the wheels is to offset the effect of the camber, to make the tires wear more evenly, and also to prevent the wheels wobbling. This is obtained by bringing the extreme forward sections closer together, generally about .4375 inch, and the same method is employed as when noting the dish or camber.

These points are brought out in the illustration at Fig. 2. That at A shows the divergence from the vertical, and B a top view of the wheel, indicating the gather.

Vehicle Batteries—Interested, Waterbury, Conn.

Can you give information upon the capacity of electric vehicle batteries; that is, the mileage that can be obtained?

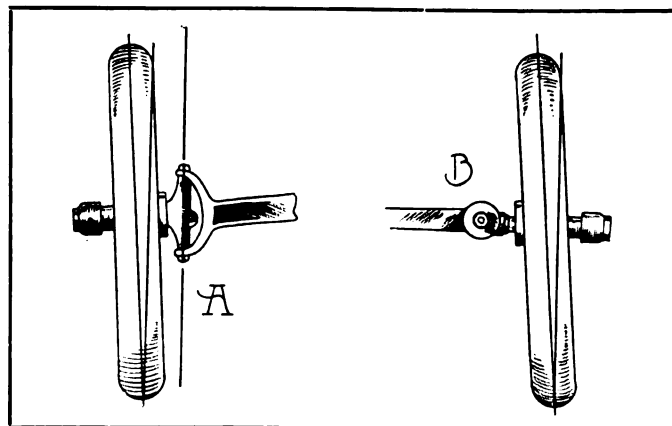


Fig. 2—Dish or Camber and Gather of Front Wheels: A, Showing the Divergence from the Vertical; B, Top View of Wheel, Illustrating Gather.

The subject was exhaustively treated in the February issue of MOTOR TRUCK under the head of Electric Vehicle Practise.

DOUBLE TAX LAW DEAD IN MICHIGAN.

The supreme court of Michigan has decided that the law providing for registration of motor vehicles in that state by horsepower, which eliminated the local taxation and would transfer from municipal to state revenue the amount paid by the motorists, has been declared unconstitutional by the supreme court of that state, and the new law being vitiated the assumption is that the old law will continue in force. This decision means that all amounts in excess of the old registration fee, which was \$3 a vehicle, must be returned to those who paid it.

The supreme court decides that while the law was entitled to a registration measure and assumedly was justified by the police power of the state, yet the sums specified were so much in excess of all necessary requirements that it could only be regarded as a means of providing a fund for a specific purpose; that is, the increase of the fee was to increase the fund to be raised, and instead of being a means for regulation it became a tax law. The opinion stated: "There can be no more labor or expense in registering a vehicle of high horsepower than in registering one of low power, and the only reasonable purpose in the graduated fee is the increased revenue. This graduated fee according to horsepower must be held to be a mere guise or subterfuge to obtain the increased revenue".

The law was tested by the supervisors of Wayne county on the ground that the tax that would go to that county under the old law, and this was a very large part of the entire revenue, would go to the state and would be used for highway construction in localities where it was not raised.

WORM DRIVEN AETNA TRUCK.

A worm and wheel driven truck of two tons capacity will be built by the Aetna Motor Truck Company, which has been organized at Detroit, Mich., with capital of \$150,000, \$50,000 of which is preferred and \$100,000 common stock. Of this amount \$113,800 has been subscribed, \$6800 paid in in cash and \$100,000 is in property. D. G. Wagner is president and William A. Eldred is secretary, and associated with them are Ernest A. Kinney, John J. Wilson and George Bumbert.

A building has been secured at Plymouth, Ind., by the Utility Motors Corporation of Chicago, and the machinery and equipment is being moved there preparatory to operating. The company produces gasoline engines for pleasure cars and trucks.

T. H. McGiehan, vice president and general manager of the Motz Tire & Rubber Company, Akron, O., underwent a successful operation for appendicitis April 18 at the Akron City Hospital, and is making a very satisfactory recovery.

RHODE ISLAND'S LIGHT LAW.

In Rhode Island after July 1 all vehicles using the roads at night must carry lights, the motor cars, wagons and trucks having the two white lamps visible from the front and a tail light, these to be displayed from an hour after sunset to an hour before sunrise, as prescribed by the law governing motor vehicle registration and operation, and all horse vehicles, save those carrying inflammable loads, must have a single lamp so displayed that it shall be visible from the front and the rear, and while no provision is made in the statute the expectation is that the lamp shall be mounted at the left side. This statute is identical with that recently enacted by the Massachusetts legislature.

The penalty for failure to comply with the provision as to lights shall be a fine to a maximum of \$20 for each offense, and in the event of a person so violating the statute refusing to give his or her correct name and address when requested by a policeman or constable a fine of \$5 may be imposed. With more than 13,000 motor cars and wagons registered in the state, and with the use of the highways by hundreds of others from out of the state each day, the universal lighting of vehicles will be a decided protection.

MARYLAND ELECTRIC TRUCK.

The Maryland Electric Vehicle & Manufacturing Company has been organized at Baltimore, Md., to build the Maryland electric wagons and trucks, and the purpose of the concern is to develop a series of sizes that will range in capacity from 1000 to 10,000 pounds. The machines will be offered at what may be regarded as moderate prices. The company is to build the batteries used in its machines and will guarantee these for 15 months, and parts necessary for replacement or repairs will be furnished to purchasers of the vehicles without charge for a year.

STUDYING TAP BREAKAGE.

At a meeting of the research division of the Society of Automobile Engineers, held April 21 at the headquarters of the organization at 1790 Broadway, New York City, one of the subjects considered was drill sizes. The breakage of taps was inquired into with a view of determining what methods might be developed to minimize the loss of these tools.

F. L. Metten, A. Cosgrove and A. Whartemby have incorporated as the Hercules Truck Manufacturing Company at Dover, Del., with capital of \$100,000, and will build motor wagons and trucks.

The Penn Spring Works has been incorporated at Baldwinsville, N. Y., with capital of \$25,000 by W. H. Robinson, F. C. Robinson and N. Hee, to manufacture motor truck springs.

S. A. E. EUROPEAN TOUR.

Will Visit Paris Salon and Olympia Show and Many Vehicle Factories.

The organization for the European invasion to be made by the Society of Automobile Engineers the coming autumn has been practically completed, and as now planned the Americans will pass two weeks on the steamers and 30 days in Continental Europe and England, being absent 44 days. This itinerary allows the tourists six days more than the tentative plan, two of which will be devoted to Paris and four to London, and the absence has been increased from 41 to 44 days.

Of the time that will be passed on foreign soil six days will be in Paris and 10 days in London, and the remainder will be given over to brief dashes into Italy, Switzerland, Germany and Belgium, with five days devoted to the journey from Switzerland down the valley of the Rhine and to stops in several cities for short periods.

The engineers will be received by different organizations where they will visit and they will have opportunity to see a great deal in the foreign factories, which will be thrown open to them. The proportions of the party are as yet unknown, but it is expected that it will number at least 75, and the total may reach 100. The plan comprehends departure from New York on Oct. 9, sailing on the Kronprinzessin Cecile of the North German Lloyd line. The party should arrive at Paris the evening of Oct. 15, and will remain there for six days. The Paris Salon will be opened Oct. 16, and this and visits to the different motor vehicle factories in the vicinage of that city will consume the time until Oct. 21, when the tourists will depart for Italy, where the next three succeeding days will be passed at Turin and Milan. Two days will be devoted to sightseeing in Switzerland, and then the trip down the Rhine will be begun, stopping at Schaffhausen, Stuttgart, Mayence, Cologne and Essen, and thence to Brussels, Antwerp, and thence by steamer to England, where London will be the objective point. The party will reach London the day of the opening of the Olympia show, and following visits to this the Americans will have opportunity to see many of the English motor car plants. The tourists will sail from Southampton Nov. 15, on the George Washington of the North German Lloyd line, and are expected to reach New York Nov. 22.

The itinerary as arranged is as follows:

- Oct. 9—Sail from New York.
- Oct. 15—Reach Paris. Headquarters, Edward VII. Hotel.
- Oct. 16-20—Visiting Paris show, and visits to the majority of the automobile and accessory factories in and around Paris.
- Oct. 21—Leave for Turin, Italy.
- Oct. 22—Turin. Arriving in morning, visiting factories and leave in evening.
- Oct. 23—Arrive at Milan and visit factories.
- Oct. 25—Leave Milan for Lucerne for sightseeing trip.
- Oct. 27—Leave Lucerne for Schaffhausen to visit factories.
- Oct. 28—Leave Schaffhausen for Stuttgart and visit factories.
- Oct. 29—Leave Stuttgart for Mayence.

- Oct. 31—Steamer trip on Rhine to Cologne.
- Nov. 1—In Cologne.
- Nov. 2—Short trip to Essen and return.
- Nov. 3—Leave Cologne for Brussels, Belgium.
- Nov. 4—In Brussels.
- Nov. 5—Leave Brussels for Antwerp and thence for London.
- Nov. 6-15—In London visiting Olympia show with side trips to many English factories.

WILL INSURE DEALERS' MACHINES.

The Manufacturers' & Dealers' Motor Underwriters is the name of a company incorporated under New York law by W. E. Metzger, E. H. Greenwood and W. B. Joyce, with capital of \$150,000, with W. E. Metzger as president, which will specialize the insurance of dealers' machines. The company has located its offices at 80 Maiden lane, New York City, and has begun business. H. A. Bonnell, who is widely known in the automobile industry and trade, resigned as assistant general manager of the National Automobile Chamber of Commerce to become secretary of the company. One form of insurance will be the issuance of short term policies by which machines can be insured by the dealers as soon as the sales have been made, a form of protection that has not been directly obtainable previously. Mr. Bonnell was formerly treasurer of the American Automobile Association, manager of the Automobile Board of Trade, and later with the National Chamber of Commerce.

CONVICTS TO MAKE BRICK FOR ROADS.

The New York legislature has appropriated \$50,000 for the construction of a plant at the state prison at Elmira for the production of brick, and it is proposed to use whatever can be turned out by the plant for the construction of state roads. The buildings will be erected and the machinery installed as quickly as practical, and it will be operated by convict labor. There is little probability that it will be in operation before late in the season, and the production will be but a very small part required for the road construction in the state.

The Hartford Auto Parts Company, Hartford, Conn., has increased the floor space occupied by its factory at the Colt armory to 32,000 square feet and has recently added to its force of workers, the increase being necessary to meet the demand for universal joints and cone clutches, which are its principal products.

The Gould Storage Battery Company has leased a building at 1761 East 18th street, Cleveland, O., and will open a branch and service station in that city as soon as the equipment and supplies can be installed.

The Federal Motor Truck Company, Detroit, Mich., has appointed R. P. Spencer, formerly with the Paeschke & Frey Company, its sales and advertising manager.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXI--Construction and Operation of Connecticut Igniter System Including a Combined Igniter and Distributer and Ingenious Automatic Switch--Employs Dry Cells or Storage Batteries as a Source of Current Supply.

By C. P. Shattuck.

SYNCHRONIZATION of the spark, or the invincible recurrence of a spark at the same point in the piston's travel, is a subject that is receiving careful consideration by ignition specialists, and during the last two years experiments and tests have proved the direct bearing of flame propagation on motor efficiency.

To obtain the maximum output of a motor the mixture must be as completely burned as possible, or in other words, the greatest energy is secured when the explosion occurs at a fixed point in the piston's travel. Some authorities hold that there is only one such point irrespective of speed and that all advancing

or retarding of the spark control is made to secure the explosion at that time.

It has been explained that with all high-tension ignition systems it is necessary to break or interrupt the primary circuit. Before the explosion takes place there are several factors to be considered. These are: The time consumed in mechanically accomplishing the break, the question of induction

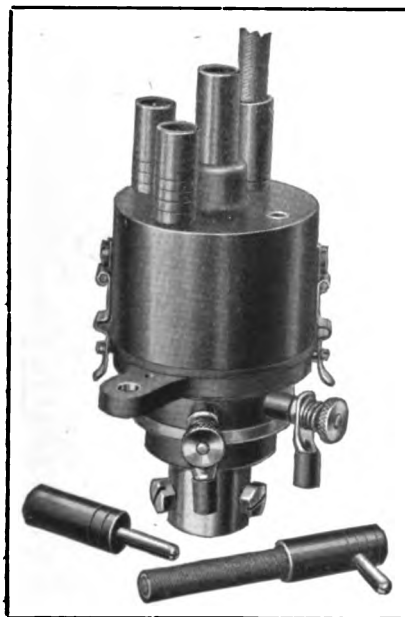


Fig. 131—The Connecticut Igniter Assembled.

lapse or the difference in time between the break in the primary circuit and the occurrence of the high-tension spark, and the rapidity of the flame propagation.

Time a Factor.

One maker of ignition apparatus holds that while the time factor in any of the above instances on slow speeds may seem inconsequential, it is important, because when a motor is turning at 2000 revolutions a minute, it means that it is turning at 33.33 revolutions a second or through 12,000 degrees a second. Or in other words, it is turning through 12 degrees every one thousandth of a second. From this it will be seen that time consumed to accomplish an explosion

is an important factor as the speed of the motor increases.

This time factor is referred to as "lag" and is effective in that degree in which it is variable. Up to that point where flame propagation starts, this "lag" when variable is a synchronism or lack of synchronism.

The elimination of this "lag" is more or less complete according to the method employed in interrupting or breaking the primary current. The position of the advance lever is also a factor. It will thus be seen that either mechanical or electrical "lag" in an ignition system of the high-tension type is an undesirable factor, especially where the speed of the piston is variable as in motor car practise.

The factors above discussed are held to be eliminated in the Connecticut automatic igniter, manufactured by the Connecticut Telephone & Electric Company, Meriden, Conn., which is well known in the automobile industry as a maker of ignition systems. The company, which has had a wide experience in building commutators, induction coils, distributors, magnetos, etc., holds that its igniter system includes all the advantages of preceding forms, and is free from the limitations to which each has been subject. It is also held that mechanical and electrical "lag" have been eliminated; that is, that there is no discoverable interval between the interruption of the primary current and the occurrence of the spark at the plug.

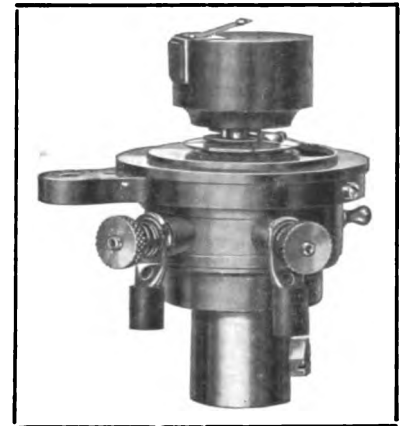


Fig. 132—Igniter with Distributor Cap Removed.

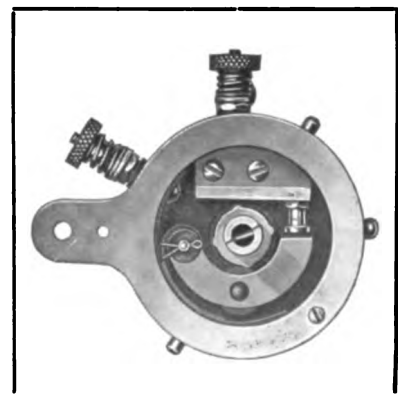


Fig. 133—Dust Cover Removed from Igniter to Show Breaker and Cam.

The system presents many interesting features, but in the main includes principles indorsed by sound electrical engineering practise. The interruption of

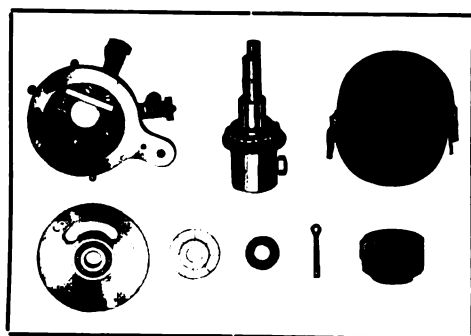


Fig. 134—Showing Igniter Used with E and G Systems Completely Disassembled.

the primary current is by a breaker box similar to conventional magneto design, and the low-tension current is built up or transformed by a coil. The source of current supply may be either dry cells or a storage battery, and the system is particularly adapted to vehicles utilizing a generator for charging the battery.

Novel Automatic Switch.

The most noticeable feature of the equipment is the automatic switch. With certain ignition systems if the switch lever be left on "Battery" the cells will become exhausted because of a closed circuit. For example: With the timer and induction coil type of ignition, it is possible for the motor to stop with the crankshaft in such position that the primary circuit would be closed and failure of the operator to move the switch lever to the "Off" position would rapidly exhaust the current supply. This is prevented in the Connecticut system, as the current is cut off automatically.

The combined igniter and distributor is shown at Fig. 131 and resembles a conventional distributor in appearance, but its operation differs considerably. It is very compact, as will be noted by the dimensions given in the diagram at Fig. 138. That for a four-cylinder motor is slightly over four inches high and 2.75 wide, these figures being overall dimensions. The

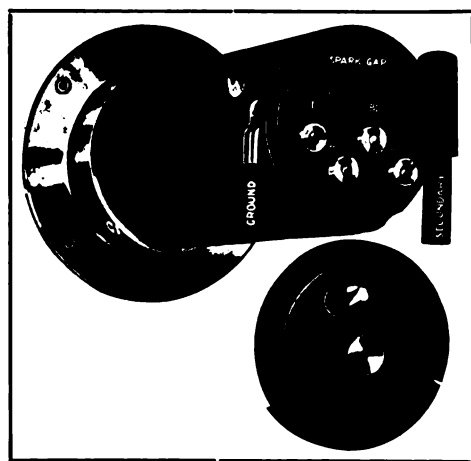


Fig. 135—Type E Combined Coil and Switch with Cover Removed to Show Terminal Connections—Note the Enclosed Spark Gap.

igniter is mounted on a vertical shaft running at half engine speed irrespective of number of cylinders. Primary circuit is interrupted and the high-tension current distributed in the same unit, and one of its qualities is its simplicity. Emphasis is laid upon the accessibility of the components and the impossibility of their assembly other than correctly. The timer and distributor as-

sembled is shown at Fig. 131. Fig. 132 depicts the distributor cap displaced, while Fig. 134 shows the apparatus completely disassembled.

A single spark is produced upon a break occurring in the primary circuit which through being closed energizes a coil, and the break is effected in the igniter by means of a cam revolving against a breaker arm. Referring to Fig. 134, also Fig. 133, it will be seen that a shaft is employed, having four longitudinal ribs, equidistant, these acting as lifters for the breaker lever.

The breaker lever is practically half a circle, with one end pivotally mounted, while at the other end is a platinum contact point. The last named member makes contact with a fixed platinum point, and, being of ample size, it is stated that it requires no attention whatsoever.

A hardened and ground steel roller is mounted on the lever member and when one of the shaft ribs or cams comes in contact with it, the lever is moved outward, separating the platinum points, actuating these much in the same manner as magneto points. The breaker arm is well insulated from the base, and it is stated that no engine ground is necessary in the primary circuit, as its winding is insulated from the secondary ground in the coil. The advantage of the design emphasized is that there is no possibility of the ignition system being affected through any short circuiting of any other electrical circuit, such as a lighting system for example.

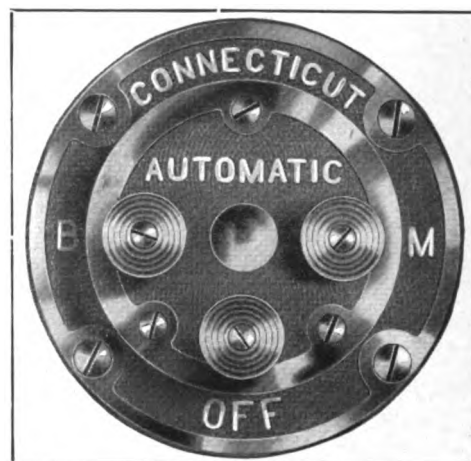


Fig. 136—The Automatic Switch—Removing Three Cover Screws Exposes All Working Parts.

Retention of Parts.

A cap or cover is fitted, carrying at its centre a bearing for the extended shaft; a dowel in the timer case, entering a hole in the cover, makes it impossible to replace it other than correctly. A mica window is incorporated over the contact points, permitting of noting their operation while running. The cover is retained by a split pin above it. A spring washer constructed of two small saucer shaped steel members, put together with concave sides facing inwardly, maintains the proper tension, and an anti-friction washer is interposed between the spring washer and the top of the timer cover.

The distributor consists of a central cylinder of insulating material impervious to heat, moisture or lubricants, and is carried at the top of the shaft, which is cut away where it enters the rotor and fits into a

hole of corresponding shape, thus obtaining a drive. This arrangement absolutely prevents improper assembling. Located in the periphery of the rotor is a radial carbon distributing brush, which is pressed outwardly by a light spring in a recess of the rotor. Connection or passage of the secondary current is by means of a light, flat steel spring on top of the rotor.

The same insulating material as is used in the rotor is employed for the distributor housing, and imbedded in its inner walls are the contacts, these being two, three, four, six or eight, according to the type of the igniter and the number of cylinders to be fired. The contacts are connected to terminals which may be either horizontal or vertical as desired.

Ingenious Switch.

The switch shown at Fig. 136 is most ingenious. It will be seen that it is provided with three buttons. One is for the battery and another for the magneto, in



Fig. 137—Rear View of Type G Automatic Switch, Showing Method of Making Connections.

case a dual system is utilized, or for two sets of batteries. The third button is a releasing member, which automatically throws out any button pushed in, thereby cutting off the current supply. There is ample room between the

buttons, permitting their operation by the hand or foot, and the construction is rugged.

The plungers on which the buttons are mounted operate through holes in a plate inside the cover plate; the perforated plate is pivoted and a spring keeps it normally pressed in one direction. When a switch button is pressed the conically shaped end of the plunger slightly swings the plate, which then snaps into a notch under the cone, holding the button down and keeping the circuit closed. When the releasing button is pressed its cone actuates the plate sufficiently to slip it out of the notch in the switch button that has been in engagement, allowing it to move upward.

Mounted on the swinging plate is a sliding bar, the ends of which reach the cones of the button plungers. The length of the plate is such that when one

button is pressed, the cone moves it out of the way, that is, towards the cone of the opposite button, and the plunger can be depressed all the way. If, however, both are pressed at the same time, both are blocked by the sliding plate, which is too long to allow both to go down together.

The automatic switch referred to, which throws out the switch disconnecting the battery in the event the operator of the car fails to do so, consists of a vibrator of the electric ball type, the hammer of which strikes the edge of the plate referred to in the description of the switch, pushing it out of the plunger notch. The current operating the vibrator is cut in by a thermostat, a mechanism that has been employed for many years in the Connecticut telephone switches. The thermostat, when heated by a continuous and abnormal flow of current, establishes a contact, and the vibrator becomes active, operating the switch, which is released in a fraction of a second, cutting off the current supply. Upon the thermostat cooling, which requires but little time, it returns to its normal position.

It is stated that the time required for the thermostat is controllable by a regulating screw. Ordinarily it is so adjusted that if the timer is short circuited when the driver closes the switch to start the engine, 30 seconds will elapse before the switch is automatically thrown out, allowing sufficient time to start to crank the motor.

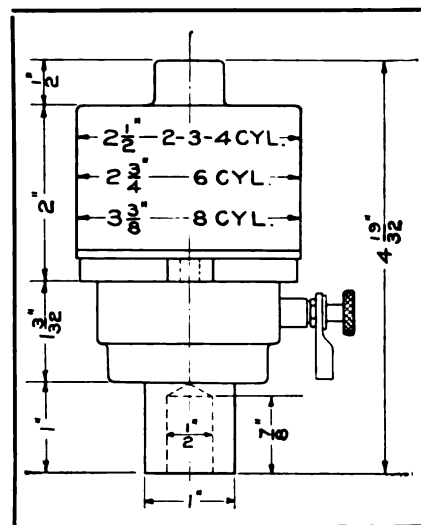


Fig. 138—Diagram Giving Dimensions of Combined Igniter and Distributor.

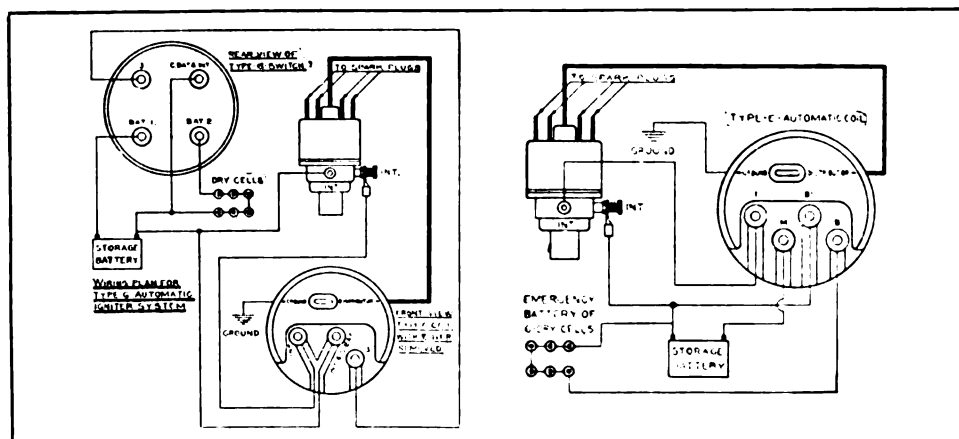


Fig. 139—Firing Plans of Connecticut System: At Left, Plan for Type G or GJ; at Right, for Type E or EJ.

Two types of igniters are produced, S and J. The former is used with the type E and G systems and is supported on the shaft through two high grade an-

nular ball bearings. Self-lubricating bearings are utilized with the type J igniter, these comprising a substance formed by mixing graphite and babbitt when the metal is in a molten state. The mixture is subjected to an enormous pressure, and bushings made of it run without lubrication.

Two types of coils are employed, E and G, and the former is shown at Fig. 135. It is of the flush dash type, and extreme care has been taken in the design of the connections, and to make the case impervious to heat, etc. It will be noted that a spark gap is incorporated to protect the secondary windings from damage in case a plug terminal becomes disconnected. The gap is enclosed in a glass tube, is easily observed, and is not accessible to fuel vapor. All terminals on the coils and switches are of the self-locking spring type, and all igniters are constructed for attachment to a .5-inch shaft, and are locked by two set screws.

It is stated that the igniter produces its hottest spark on the slowest motor speeds, and that it increases as the speed decreases, although the spark is much more than ordinarily intense at high speeds. This makes possible easy starting and throttling the motor to very low speeds without sacrificing efficiency, as the propagation of the flame is very rapid.

Laboratory tests of the Connecticut system are interesting. It has been demonstrated that it eliminates electrical "lag"; that is to say, there is no discoverable interval between the interruption of the primary current and the occurrence of the spark at the plug. It is stated that this holds true at all speeds.

Advantages of System.

It is claimed that the system operating with a fixed spark is productive of more electrical energy than a magneto manually controlled. According to charts there is a remarkable absence of electrical lag. The company believes that with a system free from lag only two positions are necessary, one for safety as when starting, and one for running. It is held that mechanical lag has been overcome in the timer, as the lifting cam acts directly on the breaker arm; that springs, etc., are eliminated, and that the action is not affected by centrifugal force.

The wiring plans for the type G and GJ systems, also for E or EJ, are shown at Fig. 139. If emergency dry cells are not used with the first named system the lead to battery post No. 2 is eliminated. The post B in the E or EJ system is not wired when cells are dispensed with.

A bulletin on "Automobiles in Hong Kong and Southern Cuba" has been issued by the bureau of foreign and domestic commerce of the Department of Commerce and Labor, Washington, D. C., which may be obtained by application to the bureau.

A branch office and sales department is to be established at Atlanta, Ga., by the Maccarr Truck Company of Scranton, Penn.

SEARLE TUBE TESTED.

A test was made in New York City April 14 of the Searle unburstable tire tubes, which are designed for use with any form of pneumatic tires. The tubes are claimed to be particularly enduring in any form of casing, no matter how much worn, and the makers maintain that patches, shoes, sleeves, etc., are not necessary to obtain from them satisfactory efficiency.

The test was made with 13 taxicabs, all fitted with two tire cases so badly worn as to be regarded as useless, which were driven from the Hotel Astor to Garden City and return. In several instances the cases were ruptured for several inches, and to insure complete test some of them were cut to have holes two inches diameter close to the bead. The taxicabs were used because a greater number of discarded shoes were obtainable, and more machines were available than might be obtained from other sources.

The only tube to fail was cut by a piece of glass bottle where it was unprotected by the casing, but aside from this the tubes endured all that was claimed they would. The Searle tube is to be manufactured and sold in this country under patent rights granted by the Searle Unburstable Inner Tube Company, Ltd., of Birmingham, England.

NET PROFITS \$1,115,609.

Gross profits of \$1,880,654 and net profits of \$1,115,609 are shown in the annual report of the Indian Refining Company for 1913, and the statement is made that this ought to be considerably increased in 1914 from the fact that a vigorous selling campaign has been inaugurated. Because of litigation involving the trade mark of the company, which has been decided favorably to a continuance of the use of "Havoline" on all its products, the company was not as aggressive in its methods during the pendency of the legal controversy, and for this reason the financial results were not as large as might have been had there not been a period of practically "marking time".

UNITED STATES RUBBER DIVIDENDS.

A quarterly dividend of two per cent. on the first preferred stock, of 1.5 per cent. on the second preferred stock and of 1.5 on the common stock has been paid by the United States Rubber Company to stockholders of record at 3 in the afternoon of April 15, payable without closing the transfer books on April 30. The United States Tire Company is a subsidiary of this concern.

Recently appointed agencies for Koehler delivery wagons are W. A. Cookerly, Macon, Ga.; A. E. Lewis, Kansas City, Mo.; Snyder & Winks, New Tripoli, Penn.; S. Sedgwick & Sons, Knoxville, Tenn., and R. S. Blaisdell, York Village, Me.

TIME-SAVING TIRE SERVICE STATIONS.

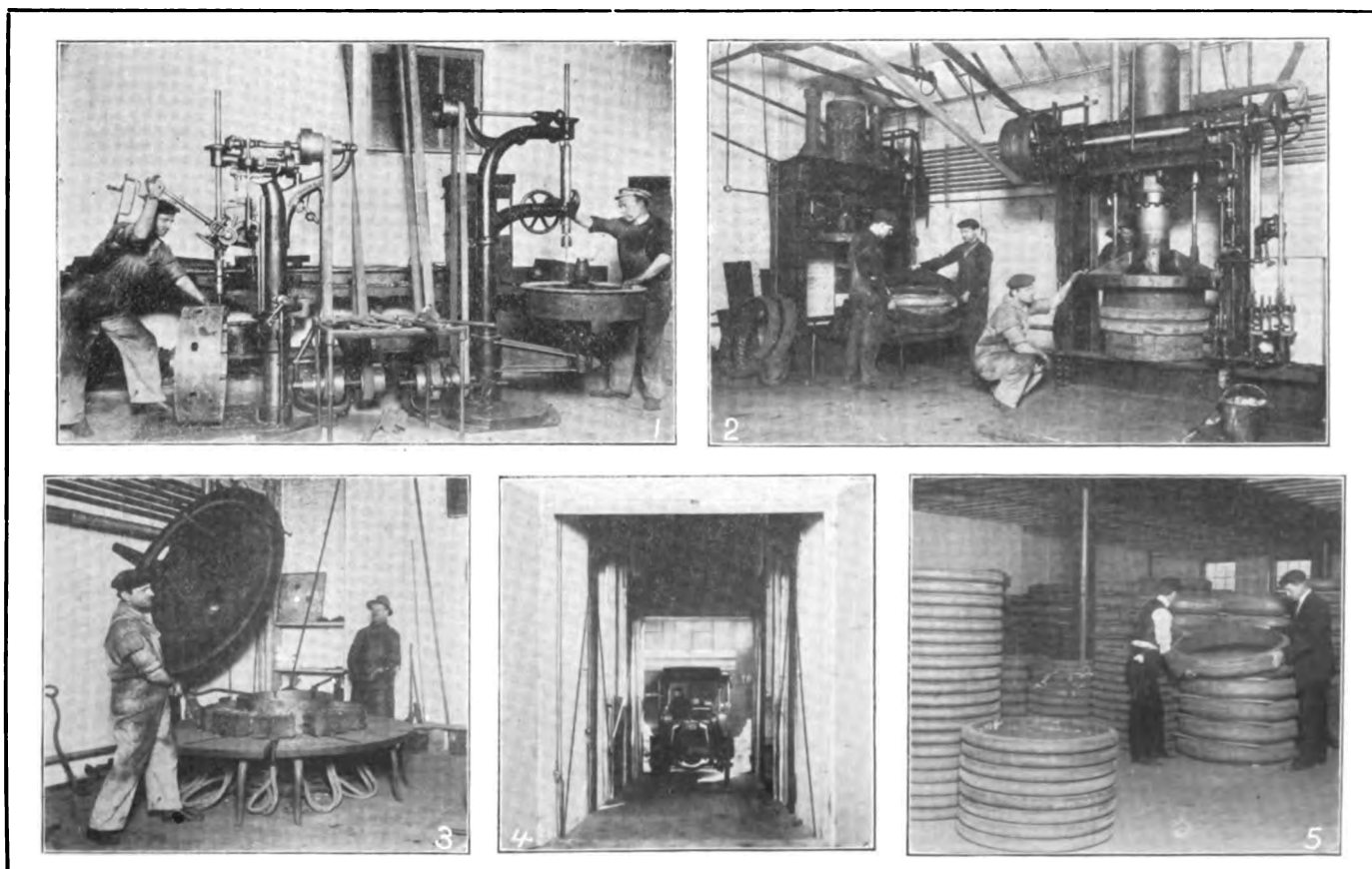
THE knowledge that a rubber tire is vulnerable, and may be damaged or ruined despite the greatest care, and the material cost of renewal, causes the owners of machines used for freight transportation much reason for serious reflection. Were a rubber tire to be expected to yield service such as may be anticipated from metal, the problem would be greatly simplified. There are instances of extreme mileage being obtained from tires that are carefully used, but the experience has been with the majority, at least, that the service has not been up to the guarantee.

The tire that will give the guaranteed mileage is regarded as being full value for the cost, and if for any reason the guarantee is not realized the owner must bear some expense. But in addition to this there is the actual loss from the period the machine is not serviceable pending renewal or repair. The withdrawal of a vehicle from use for a part or all of a day may not represent in actual cash a sum of importance, but the losses of time from this and other causes may in the aggregate represent a considerable period during the service of a machine, and there is also the possibility of business being affected because of the uncertainty or dissatisfaction of those who are served.

The majority of service power vehicles is today fitted with tires that are assumedly quickly removable.

There is, however, a considerable proportion that has the old type of equipment, in which the tires must be installed with special tools. There are services for which the pressed-on type of rim is regarded as superior to the easily removable forms. With small capacity wagons, especially when speed is desirable, pneumatic tires are used, and these are generally with quick removable rims. Pneumatic shoes are more susceptible to damage than are the solid forms, but they may be changed or a temporary repair made with hand tools under almost any circumstances. Spare tires and tubes may be carried and reasonable provision made for average exigencies.

But handling truck tires is a different proposition. Spares are rarely, if ever, carried, and changes cannot be readily made because of the weight of the shoes and rims, while chain hoists are the only practical manner of handling wheels, which are extremely heavy. The tires, if the machine is of capacity of two tons or more, are generally of two types, single and dual bands, and if spares were carried it would be necessary to provide one of each, and the weight would be of sufficient proportions to consider it. As solid tires may be used if considerably damaged, extra shoes are seldom considered, and another reason for not providing them is the large cost for equip-



Equipment and Resources of the Goodrich Service Station in New York City: No. 1, the Battery of Drill Presses in Use; No. 2, Hydraulic Presses for Removing and Installing Tires; No. 3, Removing Band from Heater in Blacksmith Shop for Installation on a Wheel; No. 4, 30-Foot Elevator That Serves as an Entrance to the Garage; No. 5, Section of the 75 by 90-Foot Tire Stockroom.

ment that deteriorates with lapse of time, no matter whether it is carried or not. Because of the limitations of the guarantees the tires are not often bought until they are wanted for use.

There are other factors that are worthy of consideration in connection with tire use. The fewer the changes the better, and the less the number of occasions for loss of time, but not even the largest public service station has the special equipment necessary for quickly handling the shoes. Generally the protection in a large private garage is limited to spare wheels on which tires are installed, and this means a change of wheels instead of the shoes, the policy being to send the wheels to a service station of a tire manufacturer.

But this applies to the owner of a number of machines, and not to the man who has several, so that with those who do not have spare wheels the best protection is an extra tire or two, but here comes in very effectually the item of investment and the question whether or not the spare tires and the possibility of loss on guaranteed service will offset the time that will be saved by the truck. This variable is extreme and cannot be estimated. For this reason many truck owners are inclined to purchase tires only as they are needed, and in many instances the wheels are sent to service stations or to branches of manufacturers for the removal of the old shoes and the installation of the new.

From the viewpoint of the tire user the time that must elapse from the giving of an order to the delivery, or for making a change on a wheel, is a factor of great importance. While there is no reason to believe that retail tire dealers can do more than supply shoes from stock, the fact remains that the owners of machines expect that they be protected so far as this is possible or practical. Tire manufacturing plants are concentrated for economic reasons, and yet to meet the demand for what is regarded as service the larger concerns have been impelled to establish stations wherever the volume of business has reached sufficient proportions to justify them.

The stations are usually located where the transportation facilities are such that the surrounding area can be well served, for those sending wheels or tires must depend upon freight or express service. The stations must be stocked with sufficient numbers of the different types and sizes, and there must be such equipment that whatever work is necessary can be quickly done. There is expectation that business will be influenced by the stations.

The service stations are by no means small establishments. Generally a warehouse is connected, from which distribution of stock can be made, and the other departments include a garage, where vehicles can be stored while work is progressing, a repair shop with facilities for every requirement, and machinery for removing and installing the tires on the wheels. The machine equipment of some stations is such that they are in every respect complete factories, for every char-

acter of work is done. Not only this, the stations must be in charge of an expert, who has available men trained in all departments, skilled in handling tires and work in connection with them, and day and night forces are often frequent because of machines being brought in for tire changes between the regular working hours.

The establishment of such stations means in each instance the investment of a considerable amount of money, the perfection of an organization, and the development of service that will satisfy patrons, and naturally they can be located only in a comparatively small number of cities.

The policy of the large tire manufacturers is to establish these stations as rapidly as conditions will justify. Pleasure car shoes can be handled at the stations and distributed from the warehouses, and some tire makers who have abandoned retail sales have equipped their warehouses with additional facilities to meet the demands. The advantage of the stations to the owner of the service wagon or truck cannot be over-estimated, for this means a diminution of time losses, and as the business is developed the facilities and resources can be improved.

One of the most interesting examples of tire service stations is that maintained by the B. F. Goodrich Company in New York City, which is of large proportions and is equipped for every work. The accompanying series of illustrations is of especial interest, as it shows the facilities provided to meet the requirements of tire users. The stockroom is 75 by 90 feet and in this is kept a large supply of shoes. A small elevator is used to carry the tires to the lower rooms. The work shop includes a blacksmith department, where the rims are removed from and placed on the wheels, and these are heated and expanded or cooled and contracted as necessary, the heating being done on large circular beds by blocks heated by gas. The beds are covered with metal shields that retain the heat and concentrate it. One view shows a heater with the crew about to remove a band for application to a wheel. Another illustrates a battery of drill presses, which are used for adapting and fitting bands for the application of the shoes. For the removal or installation of the bands large hydraulic presses are used, and these ponderous machines can be handled like the most delicate mechanism by the workmen, so that exact adjustment may be made. An idea of the size of the garage may be obtained from the fact that it has three entrances, one of which is through an elevator with a platform 30 feet in length, which is probably the largest in New York City. The other entrances are at either side of the floor, so that turning and shifting is minimized when a machine is once located. In work of any kind the delay is extremely short, and so far as the station is concerned it is practically in readiness to take on any kind of restoration or change and give the same satisfaction that would be expected from the main factory.

MILLER'S BIG 1914 CATALOGUE.

The catalogue issued for 1914 by Chas. E. Miller, 97-103 Reade street, New York City, specified as No. 28, is the largest publication yet issued by Mr. Miller, consisting of 248 pages and a cover, and it is entirely devoted to description and illustration of standard and special lines included in the stocks of the main store, or the branches in New York City and Brooklyn, Buffalo, N. Y.; Boston, Springfield, Mass.; Hartford, Conn.; Detroit, Mich.; Cleveland, O.; Philadelphia, Penn.; Atlanta, Ga.; Newark, N. J., and New Orleans, La. Mr. Miller claims to be the largest automobile supply house in America, and as he is manufacturer, jobber, importer and exporter, full lines are carried at all the stores for the benefit of the trade.

The circulation of the catalogue is 100,000, those distributed abroad being sent by freight to ports of entry and mailed by brokers, the duty being 15 per cent. The size of this edition may be judged from the fact that the white paper as received from the mill would make a strip five feet in width from New York to Washington; the pages laid end to end would make a band 7.5 inches width 1925 miles in length; the printing surface of the pages has an area of 13,721,525 square feet; piled flat the catalogues would reach skyward 2000 feet above the combined heights of the Metropolitan, Singer and Park Row buildings, three of the highest structures in the Metropolis; that 50 one-ton automobile trucks were necessary to make delivery to the postoffice for mailing. The catalogue is a reference book for manufacturers, jobbers, dealers, owners, etc., and is mailed to any person at request.

HIGH REGISTRATION TAX KILLED.

The organized endeavors of the Automobile Club of Maryland, with the assistance of interested owners and those engaged in the industry and trade, were effectual in opposing the bills pending in the legislature of that state that comprehended large increases in the registration tax. That relating to pleasure vehicles provided for a \$50 tax for a motor of 10 horsepower with graduated increase up to \$200 for motors of 40 or more horsepower, and that applying to freight wagons and trucks increased the tax from a flat rate of \$3 to a graduated scale with a maximum rate of \$65. The bills providing that all vehicles should carry lights at night and for better traffic regulations also failed of passage. The state will receive the benefit of \$6,600,000 which was appropriated for the construction of good roads.

BOTTLER'S DELIVERY WAGON.**Double-Decked Platform Body Installed on Palmer-Moore Chassis.**

The Palmer-Moore Company, Syracuse, N. Y., builder of Palmer-Moore delivery wagons, has produced a body that is designed for the special use of the Zenith City Bottling Works of Duluth, Minn., that has been installed upon a 1600-pound chassis. The bottles are carried in crates or racks, and while these may be stacked, for the purpose of facilitating handling, separation of the racks into tiers, although this requires more space and somewhat increases the height of the load, is regarded as desirable.

The wagon is manned by a driver, and that he may have the fullest opportunity to reach his customers and visit prospective patrons, as well as cover a large route, the loading and unloading of crates of filled and empty bottles must necessarily be minimized, for a considerable patronage is dependent upon the activity of the driver. Stacking the crates would mean handling them over several times, as well as a loss of time.

The body consists of two decks, each 90 inches length and 66 inches width, with a slight rail at the sides and ends to prevent the load shifting from movement of the machine. The upper deck is two feet above the lower and is supported by four corner and two side stanchions, tied by bolted angle straps, the construction being light, but very strong. The two decks have a total area of 82.5 square feet. With this form of body the crates can be handled from either side and the rear, or from the front or the running boards equally well, and the full freight can be carried so placed that no changing is necessary. The body affords every desired convenience with marked simplicity. In the event of storm the body and load may be covered by a tarpaulin that gives every protection.



Double Deck Open Body Fitted to a Palmer-Moore Delivery Wagon for the Service of the Zenith City Bottling Works, Duluth, Minn.

DELIVERS ROYALTY'S ORDERS.

Willys Utility Wagon in the Service of Baker at Heidelberg, Germany.

The German people are generally believed to be devoted to all creations of the realm of Kaiser Wilhelm—so much so that they prefer their own productions to those of other nations—and there is every reason to believe that the Germans are highly skilled as mechanics. But apparently they have not produced what will, for the price, equal American creations, this opinion being based on the attitude of Emil Roesler, a baker and confectioner of Heidelberg, the seat of the great university and one of the numerous palaces of the Emperor. One would believe that national pride and the prestige that use of domestic products would be assumed to establish would have influenced this man's choice of a delivery wagon, because his prominence in the community is such that his equipment is observed and commented on, but instead of selecting a German or even European vehicle, he purchased a Willys Utility machine, built by the Willys-Overland Company, Toledo, O.

The chassis is American from springhorns to the end of the chassis frame, but it is equipped with a full panel body that was designed for the particular purpose for which it is used—the delivery of bakery products and confectionery in the city and vicinity. In general appearance, however, the body differs very little from the standard equipment, and might escape special observation were it not for the fact that on the sides are three separate coats of arms, these being in effect notification to the public that the owner has official appointment to serve different royal families, the principal one being the Grand Duke of Baden. The machine visits the palace several times daily and delivers the Prince's bread, pastry and sweets, and in-

centidentally serves others of minor consequence.

The fact most patent is that the owner made a choice that he believed would be the most satisfactory for his investment, and that he preferred an American vehicle, which has not been frowned upon or regarded as discrediting German industries by his royal patrons.

VALUE OF TIRE SECTION.

An example of the economy of using motor vehicle tires of sufficient size was effectually demonstrated by the Factory Oil Company, Akron, O., which is operating a 3000-pound White machine. The initial equipment was 38 by 4.5-inch shoes, which were removed at the expiration of six months. The tires were replaced with 39 by 5.5-inch shoes, which were driven for a year, covering more than 15,000 miles.

AUTOMATIC IGNITION COMPANY.

Garry E. Wayman, S. A. Braden and E. J. Stehick, all of Pittsburg, Penn., have incorporated the Automatic Ignition Company, with capital of \$600,000, which is to locate in Pittsburg and manufacture spark plugs and different forms of ignition system components adapted for all kinds of motor vehicles and internal combustion engine installations.

MYSTERY OF THE PALMER-MOORE.

The Palmer-Moore Company, Syracuse, N. Y., has a mystery to deal with in that it recently sold a delivery wagon to the Cia, Transcontinental de Petroleo, Tampico, Mexico, which was shipped from the factory with the expectation that it was to be transferred to a steamer sailing April 17 for Tampico. The consignee is one of the largest concerns engaged in producing and refining petroleum in that section of Mexico, and it had bought the machine to use it as a patrol wagon, the purpose being to assign a crew of guards to it and carry the men to such parts of the company's property as conditions might necessitate. Whether the wagon will eventually reach its destination, or will be seized and pressed into the service of the American forces is the mystery, and with the conditions as they now are in Mexico there is some probability that it will not be quickly solved. The builder says it will do good service no matter who possesses it, and hopes a report of it will be received.



Willys Utility Delivery Wagon Used by Emil Roesler, Baker and Confectioner, of Heidelberg, Germany, to Serve Royalty and Other Patrons.

NEW ENGLAND CONVENTION OF THE E. V. A.

THE success of the promotion campaign of the Electric Vehicle Association of America is through the activity and the enthusiastic co-operation of the members, and of all the divisions of the organization there is none as consistently persistent as the New England section. This body is made up of the members of the Electric Motor Car Club of Boston and individuals associated with various electrical interests throughout the New England states.

The second annual convention of the electric vehicle interests of New England, which has been organized by the New England section, will take place at the Engineers' Club, Arlington and Newbury streets, Boston, beginning Tuesday, May 19, and will continue two days. There will be three business sessions but these will be preceded by the May meeting of the New England section, which will take place Monday evening, so that practically three days will be given over to the activities of the electric vehicle interests.

The May meeting of the New England section will take place at the American House, Hanover street, Boston, beginning at 6:30 the evening of May 18, and there will be a dinner. Invitations have been extended to members of the Boston Chamber of Commerce and officials of the different railroad and steamship lines affording service to Boston in particular and New England in general, and there is reason to expect a very large attendance of men of prominence in all manner of transportation enterprises. The principal speaker of the evening will be Fred A. Hortter, car accountant of the Boston & Maine railroad system, whose subject will be "The Effect of the Motor Truck on Terminal Freight Congestion", which will be specifically applied to Boston and vicinity, dealing with the conditions that can be best realized by those who have to meet them. Following the address there will be discussion and there will be consideration of the influence of the different bodies and the possibilities for improvement.

The first session of the convention will take place the afternoon of May 19, beginning at 1, the registration taking up the greater part of the morning. The second and third sessions will take place Tuesday evening and Wednesday morning. The programme will include the following papers:

"Co-Operation", by W. H. Blood, Jr., former president of the Electric Vehicle Association, associated with Stone & Webster of Boston, Mass.

"Recognition of the Electric", by Hayden Eames, president of the Standard Electric Company, Detroit, Mich.

"The Electric Vehicle Association of America", by A. Jackson Marshall, executive secretary of the Electric Vehicle Association of America, New York City.

"Garaging and Service", by J. C. Bartlett, president of the Bartlett Garage, Philadelphia, Penn.

"Competition—Fair and Unfair", by A. Vere Shaw of the Peerless Motor Car Company, Boston, Mass.

"What Constitutes a Good Electric", by A. C. Fach of the Rauch & Lang Carriage Company, Cleveland, O.

"Utility of the Electric Vehicle, Pleasure and Commercial", by E. J. Bartlett of the Baker Motor Vehicle Company, Cleveland, O.

"Weak Links in Electric Truck Salesmanship", by E. Nelson Carle, advertising manager of the General Vehicle Company, Long Island City, N. Y.

"The Relative Fields of Electric, Gasoline and Horse Trucks", by H. F. Thomson, instructor of the Electric Engineering Department of the Massachusetts Institute of Technology, Boston, Mass.

"Touring by Electric Automobiles", by J. S. Codman, treasurer of S. R. Bailey & Co., Boston, Mass.

In connection with the convention will be an open business forum which will be conducted by Converse D. Marsh of New York City.

Following the afternoon session Tuesday there will be a visit of the delegates to the splendid garage and service station of the Edison Electric Illuminating Company of Boston in Massachusetts avenue, Boston, which is the largest and most carefully equipped station in the world. The visitors will be shown about and the equipment exhibited and demonstrated and a beefsteak dinner will be partaken of. The evening session of the convention will be held at the service station.

The concluding session of the convention will be held the following morning at the Engineers' Club, and at its conclusion the delegates will proceed to Bass Point, Nahant, where an outing and sports will be enjoyed, and a dinner will be served at the Bass Point House in the evening, at which there will be brief speeches. The arrangements for the convention have been made by a committee of which Charles H. Miles is chairman. An attendance of several hundred is anticipated and visitors are expected from all parts of the East.

The creditors of the defunct Grabowsky Power Wagon Company have received a third dividend of five per cent., making a total thus far paid by the trustee of 35 per cent., in addition to the 20 per cent. paid by the creditors' committee, or 55 per cent. in all. Another dividend is expected.

The Chicago sales office of the United States Light & Heating Company of Niagara Falls, N. Y., has been removed from 1013 People's Gas building to 2335 State street, this being a consolidation of the sales and service departments.

UNDERWRITERS ADJUST INSURANCE RATES.

New Schedule for Western and Southeastern Departments, but That Applying to Eastern Section Continued with Revision of Non-Valued Form of Policy.

THE insurance rates for the entire country were considered, amended and adjusted by the Automobile Underwriters' Conference at its meeting in New York City, April 10, the purpose being to make the rates uniform in the different departments, the country for the purpose of motor vehicle insurance being divided into departments, to which specific classification and rates are applied. In the general application of insurance policies to motor vehicles there is no distinction made between pleasure and freight or service machines, and for this reason the schedules determined do not make separate rates for the two classes.

One of the most important results determined was that the dealers in western, southwestern and southeastern states cannot insure vehicles in their possession against theft or fire at the rates charged for pleasure car insurance, even where short rate cancellation is provided for.

The conference adopted new schedules for the Western department, which includes the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Kansas, Nebraska, North Dakota, South Dakota, Wyoming, Colorado and New Mexico and for the Southeastern department, which is made up of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Oklahoma and these were made effective April 20.

A schedule that was adopted about a year ago for the New England and Middle department, including the Metropolitan district, was continued with the revision of the non-valued form of policy.

By reference to the following schedules one will note that provision is made for a reduction in premium amounting to 15 per cent, if the vehicle insured is equipped with a fire extinguisher such as is approved by the Underwriters' Laboratories of the National Board of Underwriters, and the extinguisher is constantly carried on the machine. This provision was added to the policies last autumn after it had been established by the Automobile Insurance Company of Hartford, a company not having membership in the Automobile Underwriters' Conference, and no extinguisher of the pump type of quart capacity has been approved by the laboratories save that made by the Pyrene Manufacturing Company, New York City.

The value of the new rates as established is principally to the insurance companies, as this eliminates the need of varying records and simplifies the office work, while it affords protection at a given figure with reference to any department. These details are of no consequence to the owners of insurable vehicles, for

the least price obtainable is the main desideratum, but business equity demands that the protection given be the same throughout the country wherever conditions are at parity. This is the nearest to national uniformity in rates ever adopted by the underwriters.

The new schedules are the following:

WESTERN AUTOMOBILE SCHEDULE.

On gasoline power driven private pleasure motor cars and commercial vehicles, such as trucks, delivery wagons, based on manufacturers' original list prices:

	Class A.	Class B.	Class C.
Limits of amount of insurance include equipment, but not additional bodies. See additional equipment and additional bodies rules below.....	\$3500 and over	\$1500 to \$3599	\$700 to \$1499
This and Next Year Models—Insure for not to exceed actual cost or less than 50% of original list price	1½%	1¾%	2%
Last Year Models—Class A, amount of insurance at option of company; Class B, not more than 70% of original list price; Class C, not more than 60% of original list price	1½%	2%	3%
Year Before Last Models—Class A, amount of insurance at option of company; Class B, not more than			

CLASS No. 1

AMOUNT FOR INSURANCE Including Equipment But Not Extra Bodies Subject to "Instructions and Limits"	Original List Price of Automobile, when New (Not Second Hand), Excluding Cost of Additional Equipment and Extra Bodies												
	4500 and Up	3500 to 6499	4500 to 5499	3500 to 4499	3000 to 3499	2500 to 2999	2000 to 2499	1500 to 1999	1000 to 1499	700 to 999	500 to 699	300 to 499	200 to 299
6500 and up	1½%												
5500 to 6499	1½%	1¾%											
4750 to 5499	1½%	1¾%	1¾%										
4000 to 4749	1½%	1¾%	1¾%	1¾%									
3500 to 3999	2%	1½%	1¾%	1¾%	2%								
3000 to 3499	2½%	2%	1¾%	1¾%	2%	2%							
2750 to 2999		2½%	2%	1¾%	2%	2%							
2500 to 2749			2½%	2%	2½%	2%	2%						
2250 to 2499				2½%	2½%	2%	2%						
2000 to 2249					2½%	2½%	2%	2%					
1800 to 1999						2½%	2½%	2%	2%				
1600 to 1799							2½%	2½%	2%				
1400 to 1599								2½%	2½%	2%			
1200 to 1399									2½%	2½%	2%		
1000 to 1199										2½%	2½%	2%	
800 to 999											2½%	2½%	2%
700 to 799												2½%	2½%
600 to 699													2½%
500 to 599													2½%

All cars listed at less than \$700 take a rate of 2½%, irrespective of the amount insured, but the minimum premium for full term of policy shall be \$12.50, or with theft and valued policy clauses eliminated, the minimum premium shall be \$10.00.

First Section of Rate Card Applying in New England, Middle Department and Metropolitan District.

50% of original list price; Class C, not more than 40% of original list price	2½%	3½%	4%
Minimum premium			\$15
Three-Year-Old and Older Models—Class A, amount of insurance at option of company; Class B, not more than 30% of original list price; Class C, not more than 20% of original list price.....	2½%	4½%	5%
Minimum premium			\$15

Note—Exceptional cases may arise where car is well owned and is in very good physical condition where limits on "three-year-old and older models" are not sufficient.

cient. In such case refer to company, with full particulars, when slightly increased amounts may be allowed, but in no case to exceed 40 per cent. of original list price.

Reduction—A reduction of 50c from above rates will be allowed for attachment of "non-valued ex-theft and automatic reinstatement" indorsement by use of clause furnished you for that purpose.

Cars Listing Less Than \$700.

	Rate	Minimum premium
Fire and theft.....	3 1/4 %	\$12.50
This and next year—		
Fire only	1 1/2 %	7.50
Fire and theft.....	3 1/4 %	12.50
Last year and older—Fire only.....	3 %	10.00

Electric Automobiles.

Rate for full form of fire and theft floater (all models)	1 1/4 %
Rate for restricted form.....	1 %

Dealers' Automobiles.

	Fire & theft Restricted floater	fire floater
New gasoline automobiles—		
List price \$3500 or over.....	2 1/4 %	2 %
List price \$1500 to \$3499.....	2 1/2 %	2 1/4 %
List price less than \$1500.....	2 1/2 %	2 1/4 %
Electric automobiles	2 %	1 3/4 %
Steam automobiles	3 %	2 3/4 %
No risk accepted where boiler and burner are located in rear of dashboard. Second-hand cars, 1 per cent. ad-		

CLASS No. 2

AMOUNT FOR INSURANCE Including Equipment Not Ref Extra Bodies Subject to "Instructions and Limits"	Original List Price of Automobile, when New (Not Second Hand), Excluding Cost of Additional Equipment and Extra Bodies												
	6500 and up	5500 to 6499	4500 to 5499	3500 to 4499	3000 to 3499	2500 to 2999	2000 to 2499	1500 to 1999	1300 to 1499	1100 to 1299	900 to 1099	700 to 899	
6500 and up	2 1/4												
5500 to 6499	2 1/4	2 1/4											
4500 to 5499	2 1/4	2 1/4	2 1/4										
3500 to 4499	2 1/4	2 1/4	2 1/4	2 1/4									
3250 to 3499	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4								
3000 to 3249	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4							
2750 to 2999	3	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4						
2500 to 2749	3 1/4	3	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4					
2250 to 2499	3 1/4	3 1/4	3	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4				
2000 to 2249	4	3 1/4	3 1/4	3	3	2 1/4	2 1/4	2 1/4	2 1/4				
1750 to 1999		4	3 1/4	3 1/4	3 1/4	2 1/4	2 1/4	2 1/4	2 1/4	3 1/4			
1400 to 1749		4 1/4	4	3 1/4	3 1/4	3	2 1/4	2 1/4	2 1/4	3 1/4	3 1/4		
1200 to 1399			4 1/4	4	4	3 1/4	3	2 1/4	2 1/4	3 1/4	3 1/4	3 1/4	
1000 to 1199				4 1/4	4 1/4	3 1/4	3 1/4	3	2 1/4	3 1/4	3 1/4	3 1/4	3 1/4
800 to 999					4 1/4	4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4
600 to 799						4 1/4	4 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4	3 1/4
500 to 599							4 1/4	4 1/4	4 1/4	3 1/4	3 1/4	3 1/4	3 1/4
400 to 499								4 1/4	4 1/4	4 1/4	4 1/4	4 1/4	4 1/4

All cars listed at less than \$700 take a rate of 3 1/4 %, irrespective of the amount insured, but the minimum premium for full form of policy shall be \$12.50, or with theft and valued policy classes eliminated, the minimum premium shall be \$10.00.

Second Section of Rate Card Which Is in Force in the Eastern States.

ditional rate must be charged. Pro rata cancellation allowed with a minimum charge of \$1.

SOUTHEASTERN AUTO SCHEDULE.

Rates for the full form of policy, gasoline pleasure and commercial type cars:

	Class		
	A.	B.	C.
Original list price of automobiles when new, excluding cost of additional equipment and extra bodies	\$3500 and over	\$1500 to \$3499	\$1499 and less
This and Next Year Models—Insure for not more than actual cost.....	2 1/2 %	2 1/2 %	2 1/4 %
Last Year Models—Insure Class A for not more than 80%, Class B for not more than 60% and Class C for not more than 50% of list price	2 1/2 %	3 %	3 %
Year Before Last Models—Insure Class A for not more than 70%, Class B for not more than 50% and Class C for not more than 40% of list price.....	3 %	3 1/4 %	3 1/2 %
Three-Year-Old Models—Insure Class A for not more than 60%, Class B for not more than 30% and Class C for not more than 20% of list price	3 1/4 %	4 %	5 %
Note—Second-hand cars, charge 1/2 per cent. in addition to above rates.			
Electric Cars—Models of all years, 2 per cent.; second-hand cars, charge 1/2 per cent. in addition to above rate. Maximum insurable amounts at the option of underwriter.			

Taxicabs, Livery and Renting Automobiles—All risks of this kind must be submitted to the home office. If approved, will be written at not less than 1 per cent. in addition to schedule rates, subject to the following indorsement:

"In consideration of \$..... additional premium, permission is hereby granted for the automobile herein insured to be used for carrying passengers for a compensation, provided it is under the personal supervision and guidance of the assured or a chauffeur in his employ while being so used".

Rates for the Restricted Form of Policy.

(The theft and reinstatement features excluded from the full policy by attaching the indorsement provided for that purpose.)

Electric Automobiles, Taxicabs, Livery and Renting Automobiles, Gasoline Pleasure and Commercial Automobiles—A reduction of 1/2 per cent. allowed from the rates for the full form of policy.

Minimum Premium.

For the full form of policy.....	\$12.50
For the restricted form of policy.....	10.00

Dealers' Automobiles.

Rates for full form of policy:

New gasoline cars—	
Listing for \$3500 and over.....	2 1/4 %
Listing for \$1500 to \$3499.....	3 %
Listing for \$1499 and less.....	3 1/4 %
New electric automobiles, all models.....	2 %
New steam automobiles, all models.....	3 1/4 %
(Subject to 1 1/4 % reduction if boiler and burner are located in front of dashboard.)	

For second-hand and rented cars charge 1 per cent. in addition to above rates. Pro rata cancellation allowed with a minimum charge of \$1 except on cars listing for \$1499 and less the minimum charge is 50c. Amounts of insurance at option of underwriter.

Rates for the Restricted Form of Policy—A reduction of 1/4 per cent. is allowed from the above dealers' rate for the elimination from the full policy of the theft and reinstatement features. Minimum premiums same as above.

Fire Extinguishing Devices—A reduction of 15 per cent. of the premium is allowed if a device approved by the Underwriters' Laboratories of the National Board of Fire Underwriters is carried on the automobile and an indorsement provided for that purpose is attached to the policy. This reduction, however, is not allowed on additional premiums for the theft full coverage, collision sustained and property damage.

European Privilege—At an additional rate of 1 1/2 per cent. policies may be extended to cover a European trip under the form of indorsements provided for that purpose. If the risk of the transatlantic trip, going and returning, be eliminated, this privilege can be granted without extra charge.

SCHEDULE FOR EASTERN STATES.

The schedule for the eastern states, which applies to New England and the Middle department, including the Metropolitan district, is shown in detail in the accompanying charts. In connection with these it should be stated that all gasoline vehicles are for the purpose of rating divided into two general classes. In No. 1 class the rates included in the columns A, B, C and D apply to machines of last year, this year and next year's production; the rates stated in columns E, F, G and H apply to machines of this year and next year's production; the rates specified in columns J, K, L and M apply to machines of this year and next year's production, and the special provision for rate for those listed at less than \$700 value, applies to machines of this year and next year's production. The No. 1 classification rates shall apply to machines in the hands of the original owners.

No. 2 class includes all machines not included in No. 1 class.

The other specifications of the schedule are as follows:

Instructions and Limits.

Amounts to be insured must not be more than actual value and be limited as follows: Columns A, B, C and D, cars of this year and next year models for not less than 50% of original list price. Columns E, F, G and H, cars of this year and next year models for not less than 50% of original list price; cars of last year models for not more than 80% of original list price; cars of year before last models for not more than 60% of original list price; no policy on cars of models earlier than the above shall be issued for an amount in excess of 40% of original list price. Columns J, K, L and M, cars of this year and next year models for not less than 50% of original list price; cars of last year models for not more than 70% of the original list price; cars of year before last models for not more than 50% of original list price; no policy on cars of models earlier than the above shall be issued for an amount in excess of 40% of original price.

Additional Equipment.

In addition to the amounts fixed by these limits, additional equipment may be insured for not exceeding \$300 on cars in columns A to H inclusive, and \$200 on any other cars by means of the following form of indorsement:

"In consideration of an additional premium of \$....., the sum insured under this policy is increased by \$..... to cover the value of additional equipment not furnished with the car by the manufacturer at its list price; all other terms and conditions remaining unchanged".

Additional premium for this additional amount shall be charged for at the same rate as charged in the body of the policy. The rate on the policy to be computed without reference to this rider.

Electric Automobiles.

Rate for all models 1½%. A reduction of ¼ of 1% for the elimination of theft and valued policy clauses is permitted using the indorsement provided for that purpose. Amount of insurance at discretion of company.

Steam Automobiles.

Cars of this year and next year models, rate not less than 3%. Cars of last year models, rate not less than 3½%. A reduction of ¼ of 1% is permitted if boiler and burner are located in front of dashboard. A reduction of ¼ of 1% is permitted for the elimination of theft and valued policy clauses using the indorsement provided for that purpose. Amount of insurance at discretion of company.

Livery and Renting Automobiles.

All applications covering cars used for livery and for renting purposes must be submitted to this office. If approved they will be written subject to the following clause, not less than 1% additional being charged:

"In consideration of \$..... additional premium permission is hereby granted for the automobile herein insured to be used for carrying passengers for a compensation, provided it is under the personal supervision and guidance of the insured or a chauffeur in his employ while being so used".

Additional Bodies.

In determining the original list price of automobiles having more than one body, the sum of the cost of the chassis and the higher priced body shall be taken as the original list price and the amount of insurance for the purpose of arriving at the rate to be charged shall be the amount insured on the chassis and the higher priced body. No change to be made in the classification of the car during the policy period.

In the case of an automobile equipped with an extra body or bodies, a specific amount must be applied to the chassis and equipment and to each body, the same rate being charged on the extra body or bodies as is charged on the automobile. The following clause to be used:

"In consideration of an additional premium of \$..... on and after date this policy shall cover an additional amount of \$....., which shall apply only on extra body used in connection with the automobile insured hereunder, and the insurance on the chassis and original body shall be divided as follows: \$..... on chassis and equipment; \$..... on extra body".

All other terms and conditions of this policy remaining unchanged.

Dealers' Automobiles.

On new gasoline cars charge 2¼% in columns A to D; 2½% in columns E to H, and 2¾% for all others.

On new electric cars charge 2% for all models.

On new steam cars charge 3¼% for all models, except where boiler and burner are located in front of dashboard, where a rate of 3% shall apply.

On all second-hand cars 1% additional rate must be charged.

Pro rata cancellation allowed with a minimum charge of \$1, except that the minimum charge on new cars listed at less than \$1500 shall be 50c.

Amounts insured at option of underwriters.

Note—Automobiles in the hands of dealers may be written under the ordinary form of policy at rates provided for private pleasure cars subject to cancellation on a short rate basis only, except pro rata cancellation may be allowed when a new policy is issued on the same car.

A reduction of ¼ of 1% will be allowed for the elimination of theft and valued policy clauses, but in all cases the minimum charge of \$1 and 50c shall apply as above indicated.

Commercial Automobiles.

Shall be written for amounts, and at the scheduled rates, as provided for private pleasure automobiles.

Second-Hand Cars.

Cars in hands of other than the original purchaser of the car when new shall in no case be insured for an amount in excess of the cost of the same to the insured.

REVISED NON-VALUED RATES.

The schedule of rates for non-valued form of policy, excluding theft and reinstatement clauses, applying to New England, the Middle department and the Metropolitan district, as revised, and applied April 20, is as follows:

Gasoline Pleasure Cars.

	Per Cent.
Cars of this and next year models—	
Insured for not less than 80% of list price.....	1½
Cars of last year models—	
Listing \$3500 and over.....	1½
Listing \$1500 to \$3499, insured for not exceeding 80% of list price.....	1½
Listing under \$1500, insured for not exceeding 70% of list price.....	2
Cars of year before last models—	
Listing \$3500 and over.....	2
Listing \$1500 to \$3499, insured for not exceeding 60% of list price.....	2½
Listing under \$1500, insured for not exceeding 50% of list price.....	2½
Cars of models three years old—	
Listing \$3500 and over.....	3
Listing \$1500 to \$3499, insured for not exceeding 40% of list price.....	3
Listing under \$1500, insured for not exceeding 40% of list price.....	3½
Four-year-old models and older—	
Minimum rate, insured for not exceeding 40% of list price	4½

Electric Cars.

All models	1½
------------------	----

Commercial Trucks.

Of not less than one ton capacity—	
This and next year models.....	1½
Cars rented, leased or used for carrying passengers for compensation—charge 1% in addition to above rates.	
Minimum premium, \$5.	

CREDITORS DIRECT BUSINESS.

The business of the Standard Roller Bearing Company, Philadelphia, Penn., is now controlled by a committee of five representing the creditors, the members being Joseph Wayne, Jr., William C. Potter, Herbert DuPuy, James P. Lee and Charles T. Taylor; this form of administration being recommended by the receivers. The committee has been authorized to carry on the business until May 1, 1915, and, if necessary, to continue for a period of not more than six months following that date. The company has an indebtedness of approximately \$1,500,000, this being to bond holders, banks and general creditors in proportions of about a third each. The quick assets are appraised at \$792,000 and the assets at \$1,831,432.

SECRETARY KELLY ENTERTAINS.

At the Union Club, Cleveland, O., on May 6, George H. Kelly, secretary of the Baker Motor Vehicle Company, entertained a group of men well known to the electrical and electric vehicle interests of the country. The guest was Frank W. Smith, president of the Electric Vehicle Association of America, who was visiting the Baker factory. Following his visit to the factory Mr. Smith inspected the garage and station of the Delivery Company in East 22nd street, which uses a considerable number of electric trucks and wagons, and the Baker City Sales electric garage, which is claimed to be one of the largest and best equipped garages of the world, his attention being especially directed to the equipment. Mr. Kelly's other guests were S. E. Doane of the National Electric Light Association, Manager L. P. Sawyer of the Buckeye Lamp Company, President C. L. F. Wieber of the Rauch & Lang Carriage Company, General Manager George L. Milner of Erner Electric Company, Commercial Agent Mathias Turner of the Cleveland Illuminating Company, Commercial Manager T. P. Cagwin of the Cleveland Telephone Company, Manager H. B. Gay of the Cleveland office of the Electric Storage Battery Company, District Sales Agent George D. Smith of the General Vehicle Company, Manager Ayers of the truck department of the General Motors Company and President Hayden Eames of the Standard Electric Car Manufacturing Company.

TRACTION COMPANY OPENS GARAGE.

A building owned by the Wilmington & Philadelphia Traction Company at Wilmington, Del., has been converted into a garage for electric machines, and the company proposes to maintain a public service station as a part of its business. The structure was originally the main power plant of the company, which operates a street railway system, but later on was given over to boosting the current distributed to the trolley wires in the city. With the improvement of the facilities of the company the building was not useful and to make it productive and to give impetus to the use of electric vehicles, the garage was decided on. The greater part of the business expected is from the owners of wagons and trucks, although pleasure cars will be garaged. The company operates a trolley and telephone system at Chester, Penn.

"UPLIFTING" STATE ROADS.**Governor Dunne Inaugurates Campaign to Improve Illinois Highway.**

Governor Edward F. Dunne was the most active citizen of Illinois April 15, which day was named by him by proclamation for all public-spirited citizens to unite in working on the highways and inaugurate a campaign intended to "pull Illinois out of the mud". It was a strenuous occasion for thousands who responded to the call, for throughout the state individuals and organizations of all kinds began an attack that was primarily a reduction of the ruts by dragging and the filling and evening of the surfaces, for obviously without careful experience and tools and good supervision permanent improvement could not be made.

The enthusiasm of the citizens in some of the communities ran high and a great deal of practical work was done, but the real purpose was to direct the attention of the people to the conditions that existed and to demonstrate to them that systematic betterment would bring about material benefit and economy of transportation. Governor Dunne, accompanied by men interested in educating the people to the advantages of improved roads, officials of motoring organizations, state and county and local officials, and men prominently identified in commercial and industrial enterprises, drove from early morning until late in the evening through different communities. He made a score of speeches in advocacy of the construction and substantial maintenance of good roads, and he took part in at least a dozen undertakings.

One of the events of the day was at Mooseheart, where the industrial farm of the Loyal Order of Moose is located, where he turned the first spade of



Governor Dunne of Illinois Addressing the Citizens of Mooseheart, Ill., from a White Tractor Constructed for Road Building in Kane County.

earth on a new road, and made a speech from a White tractor. The machine is a truck specially built for construction work, being geared low, having very wide tired wheels, and fitted with a dumping body. It may be used for hauling trailers or operated as a unit, and will serve for spreading and rolling material, as well as pulling drags, plows and graders. With the wide steel tire equipment it may be driven on very soft ground, where animals would not have footing. The statement is made that one tractor has done the work for which 30 mules were required and that the saving through its use was approximately \$700 a month.

S. A. E. RESEARCH COMMITTEES.

The Metropolitan section of the Society of Automobile Engineers has organized a number of research committees which will make special investigations and will make general report, some to be reflected by conclusions of the committees instead of individuals. The committees have been chosen with a view of obtaining special information on subjects which promise to be productive of extremely beneficial results. The committees are:

Gas-electric vehicles, David Beecroft, chairman; William P. Kennedy and Lars G. Nilson. Kerosene carburetors, A. B. Browne, chairman; W. Rautenstrauch, Joseph Tracy and Roger B. Whitman. Greases, H. M. Martin, chairman; George K. Bradfield, W. R. Parish and L. P. Prossen. Non-electric continuous torque transmission, L. M. Dieterich, chairman; Morris R. Machol and John R. Cautley. Engine characteristics, James L. Breese, chairman; Lloyd A. Busby, Robert McA. Lloyd, Finley R. Porter and W. M. Power. Governors, Arthur J. Slade, chairman; C. W. Fletcher and H. G. McComb.

VACUUM OIL COMPANY'S REPORT.

During the year 1913 the Vacuum Oil Company, Rochester, N. Y., which has capital of \$15,000,000, did a business approximately 25 per cent. in excess of that of the previous year. The total assets of the company as of Dec. 31, were \$34,484,184.33, and there was a surplus of \$17,151,049.46, in addition to which was \$100,840.44 reserved for insurance. The net profit was \$3,375,373.53, to which must be added the profits from stock in foreign companies that netted \$1,457,156.18. Dividends of three per cent. were declared in April and October. The company will pay another three per cent. dividend this month.

Walter L. Mitchell, who has been associated with the Packard and International Motor Company's branches at Boston, has been made manager of the branch that has been established in that city by the United States Mill Supply Company of Providence, R. I., agent for the Mais line of trucks.

FOREIGN TRADE CONVENTION.

May 27-28 at Washington, D. C., will take place a convention for the discussion of the possibilities of American foreign trade, organized by the American Manufacturers' Export Association, the American Asiatic Association and the Pan-American Society, and based on a realization that exportation is now at a point where its future is vital to the country's prosperity. Other nations have systematic foreign trade policies, but the united export business has been developed chiefly through the abundance of natural products and the individual enterprise of manufacturers. In the volume of foreign commerce England is first, Germany second and the United States third. The general committee is headed by Lloyd C. Griscom, former ambassador to Italy and Japan.

Many commercial bodies will be represented as well as railroads and industrial enterprises. Secretary Redfield of the Department of Commerce will open the convention, and there will be papers by Fairfax Harrison, president of the Southern Railway; H. G. Hergert, president of the Illinois Manufacturers' Association; E. C. Simmons of St. Louis, Mo.; E. N. Hurley, vice president of the Illinois Manufacturers' Association; Alba B. Johnson of Philadelphia, president of the Baldwin Locomotive Works, and James A. Farrell, president of the United States Steel Corporation, and others, who will speak on vitally important subjects.

MAKING SERVICE AGENCIES.

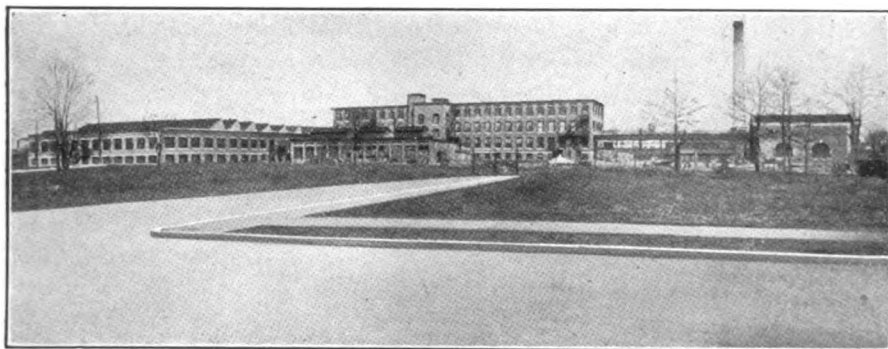
W. H. Riblet, eastern representative of the Service Motor Truck Company, Wabash, Ind., is now making agencies for his company in New England and has thus far met with excellent results. He expects to have the Service machines, which are of 3000, 4000, 6000 and 8000 pounds capacity, strongly established in this section. The Service Motor Truck Company is now in its fifth year and because of the conservative policy followed it has expanded its activities comparatively slowly, and has until now not had agents east of New York City. The Service trucks are well and favorably known and are constructed of the products of the standard manufacturers of the industry, and besides the resources of the company those of the makers of parts are at the command of the users.

The Pull-More Motor Truck Company has been incorporated at Detroit, Mich., by Frank C. Krueger, Henry M. Marks, Ralph S. Moore and Marvin A. Smith, with capital of \$250,000. The company will engage in the manufacture of Pull-More tractors.

T. H. McGiehan, vice president and general manager of the Motz Tire & Rubber Company, Akron, O., has sufficiently recovered from an operation for appendicitis as to be at his desk for a few hours each day.

EXPORT TRADE OPPORTUNITIES.

Manufacturers or selling agents of motor trucks who are interested in the development of foreign or export trade will be interested in the desire of a firm of motor car engineers, that already represents one make of American vehicle, to increase its business. This concern wishes to secure catalogues and other detail information of trucks, from which a choice will



View Showing the Front of the New Plant of the Weed Chain Tire Grip Company at Bridgeport, Conn.

be made. Another concern wishes to purchase several machines of from 15 to 20 horsepower with bodies suited for the haulage of case petroleum, petrol and the like, and desires to make a selection from catalogues, which should be accompanied by prices and terms of selling. These may be addressed as file numbers 12,559 and 12,715 respectively at the bureau of foreign and domestic commerce, Washington, D. C., or the branch offices of the bureau—315 Custom House, New York City; 629 Federal building, Chicago; Association of Commerce building, New Orleans, La.; 76 Appraisers' Stores building, San Francisco, Cal.

GALION COMPANY REORGANIZED.

The plant and assets of the Cleveland-Galion Motor Truck Company, Galion, O. which were recently sold by a receiver, and purchased by several citizens of Galion, have passed into possession of the Galion Dynamic Motor Truck Company, which has been incorporated with authorized capital of \$250,000, \$100,000 of which will be preferred stock. The plan originated by W. J. Geer for the issuance and distribution of the stock has been approved by the Ohio Utilities Commission. The company was incorporated by John M. Delbig, Harry B. Greig, John J. Bittner, J. B. Holmes, Charles Shaef-er, N. G. Knight and G. W. Nichols.

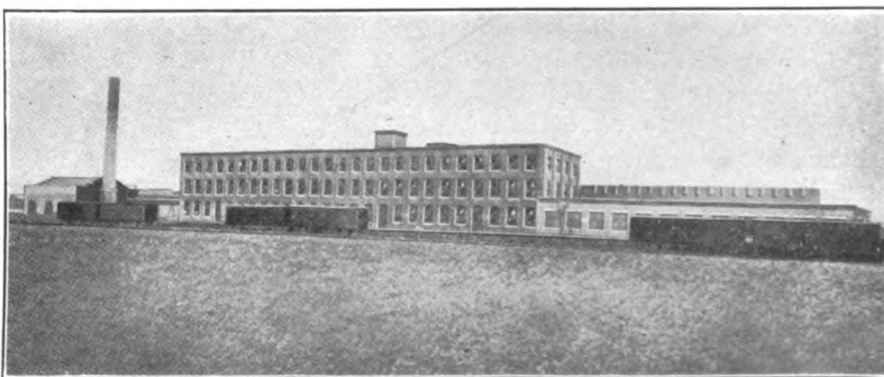
The American Carbon & Battery Company has been incorporated at Chicago, Ill., with capital of \$250,000, by W. C. Schramm, H. J. Wrape and H. Wrape.

NEW WEED CHAIN PLANT.**Company Established Its Offices at the Big Factory at Bridgeport, Conn.**

The Weed Chain Tire Grip Company, which for a number of years maintained its executive offices at 28 Moore street, New York City, has removed its headquarters to Bridgeport, Conn., where the big factory of the company is now in operation, and where it should be addressed in the future. The demand for the chains produced for all classes of motor vehicles has been such that to keep pace with it additional facilities were necessary, and the result was the construction of the plant especially for its requirements.

The buildings are of the most approved types for manufacturing purposes and have been equipped with machinery that will produce the chains with the largest degree of economy. The capacity of the plant may be judged from the fact that it will produce 60 miles of chain daily for motor vehicle use when worked to full productiveness, but there is abundant opportunity for expansion if there should be need of greater facilities. A railroad siding from the New Haven railroad makes possible the receipt of materials and shipment of products in very large quantities and eliminates handling, greatly reducing the cost of distribution, for Weed chains are sent all over the world. The plant is constructed to have an attractive appearance and compares very favorably with the most prominent manufactories of Bridgeport.

The Liggett Spring & Axle Company has removed its plant from Cleveland, O., to Monongahela, Penn. J. H. Newhart, treasurer of the company, has become general manager, following the resignation of H. R. McMann as vice president and general manager.



Rear View of the Weed Chain Tire Grip Company's New Factory, Showing the Railroad Siding and Shipping Facilities.

KNOX SALE CONFIRMED.

The sale of the real estate, machinery, merchandise, material and other property of the Knox Automobile Company, which was made provisionally by the trustee in bankruptcy, has been confirmed by the court and the plant has passed to the possession of E. O. Sutton. The statement is made that it is Mr. Sutton's purpose to continue the manufacture of pleasure cars, tractors and fire apparatus, and the company is now disposing of the pleasure cars and trucks on hand preparatory to bringing out the new products. The factory has been systematized and plans made for enlarging the production with the most approved manufacturing methods. The intention is to make the Knox Automobile Company one of the strongest concerns of the kind of the East.

DIXON STOCKHOLDERS UNANIMOUS.

The stockholders of the Joseph Dixon Crucible Company at a meeting at Jersey City, N. J., April 20, cast 9628 votes of a possible 10,000, and unanimously re-elected as directors George T. Smith, William Murray, George E. Long, Edward L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey. The officers of the company, president, George T. Smith; vice president, George E. Long; treasurer, J. H. Schermerhorn; secretary, Harry Dailey, and assistant treasurer and assistant secretary, Albert Norris, were also re-elected.

BUILDING DELIVERY WAGONS.

The first of a type of light motor delivery wagon is now being constructed by Robert G. Howard at a Boston shop, which will be placed in the market at a moderate price. Mr. Howard was for a considerable period manager of the Vulcan-Bessemer Motor Truck Company, Boston, Mass., and is well known throughout New England. The wagon will be of conventional design, having a 22.5 horsepower, four-cylinder, water-cooled motor, and the capacity will be 1500 pounds. The drive will be by shaft.

CREATES MOTOR CAR SERVICE.

The volume of business of the Pyrene Manufacturing Company in motor vehicle equipment has necessitated the creation of a department that will specialize the protection of cars, wagons and trucks, and this has been placed in charge of C. Lewis Allen, formerly New York City manager for the Service Recorder Company. The Pyrene Manufacturing Company makes and markets fire extinguishers and its headquarters are at 1358 Broadway, New York City. The resources of this new department will be at the command of vehicle owners who desire information of any kind relative to insurance protection, and will be free to all inquirers.

GRAMM-BERNSTEIN EXPANSION.

The plant of the Gramm-Bernstein Company, Lima, O., which is now inadequate for the business, is to be increased in size considerably during the present year. Work will shortly be begun on a steel and concrete structure, 110 by 48 feet, which will be used for assembling and painting, and other buildings will be erected during the spring and summer. The demand for B. A. Gramm's trucks, which are produced by this concern, has been increasing steadily and the prospects for the year are regarded as extremely bright.

GMC FACTORY IMPROVED.

The plant of the General Motors Truck Company, Pontiac, Mich., has been considerably improved by rearrangement of the different departments, changes that are expected to better facilitate the work. Much attention has been directed toward fire protection, concrete floors being installed, and a 100,000-gallon reservoir has been constructed, this being a reserve in the event of failure of the supply of city water, and in addition to the sprinkler system throughout the buildings.

MILLER NOW SELLS TRAILERS.

The sales of the patent trailers developed by the Troy Wagon Works, Troy, O., have been placed in the charge of A. R. Miller, who was for a considerable length of time engaged in sale of ball bearings and is well known in the industry. The Troy trailers have been specially developed for use with motor trucks and tractors and are constructed with capacity up to five tons. The manufacturer has found sufficient interest manifested in tractors and trailers to justify the establishment of this special department of the business.

PALMER-MOORE FOR LOZIER COMPANY.

The Lozier Motor Company, Detroit, Mich., has received delivery of a Palmer-Moore delivery wagon, fitted with an open express body, which will be used in carrying materials and supplies between the factory and the shipping terminals, as well as general transfer work about the city. The truck is fitted with a water-cooled engine and a sliding gear transmission gearset. The choice made is regarded by the Palmer-Moore Company as expert recognition of the high class qualities that are claimed for the machines it produces.

H. E. A. Raabe presented a paper on "Carburetors", which was illustrated by a projectograph, at the monthly meeting of the American Society of Engineer Draftsmen, at the Pulitzer building, New York City, the evening of April 17.

MOTOR VEHICLE EXPORTS.

During the eight months ending with February, 1914, the total value of automobiles, motor trucks, motorcycles, engines, tires and parts exported was \$23,337,332, and during the same period the value of all other vehicles exclusive of steam locomotives, was \$12,529,844. For the eight-month periods ending with February, 1912, 1913 and 1914, the exports included respectively 12,347 motor vehicles, valued at \$12,000,000, 14,488 valued at \$14,852,000 and 16,883 valued at \$15,716,000, and during the same periods the imports were 717 motor vehicles valued at \$1,572,000, 569 valued at \$1,329,000 and 230 valued at \$529,000. In March 2479 automobiles were exported from New York, and the value of vehicles and parts, exclusive of engines and tires, was \$2,204,388. In February 1779 vehicles were shipped and in January 1841.

MORE CONVICT MADE BRICK.

The paving brick plant of the Junction City Clay Products Company, Junction City, O., has been leased by the Ohio Board of Administration, and it is purposed to operate this with convict labor, the product of the plant being furnished for paving purposes wherever this can be used to good advantage in the state. This work is to be a practical trial of a plan which, if successful, will be increased, and the expectation is that eventually a sufficient supply of brick can be produced to meet the ordinary construction and repair requirements of the highway department of the state.

KELLY-SPRINGFIELD TIRE EARNINGS.

The gross profits of the Kelly-Springfield Tire Company, New York City, for the year ending Dec. 31, 1913, were \$1,264,567, and the operating expenses for the same period were \$716,289, with a balance of \$548,278. The assets of the company of the date stated were \$9,835,060, with the plant, accounts, patents, trade marks, good will, etc., valued at \$7,888,618, and the liabilities included preferred stock to the value of \$1,149,500, common stock to the value of \$4,000,000, debenture bonds to the value of \$2,850,500, and surplus of \$1,449,799.

FUTURE IN THE BALANCE.

The future of the Admiral Motor Car Company, St. Louis, Mich., which has been doubtful because of differing conditions, has not as yet been determined, and is more or less dependent upon developments. The stockholders still believe in the possibilities of the concern, and for that reason decision has been reached to manufacture the 3000-pound machines that have been ordered, and when these have been completed to make another survey of the situation. One possibility is a reorganization.

SAVINGS OF PARCEL POST.

The registration number plates used in New York State will this year be about 140,000 sets of two each, according to the estimate made by the office of the secretary of state at Albany, the greater part of which are distributed to the owners from the state capital, and previously these were sent out by express at an average cost of about 35 cents a set. They are this year distributed by parcel post at an average expense of 12 cents a set, which will result in an estimated saving for the year of approximately \$25,000.

GRUENFELDT GOES ABROAD.

Emil Gruenfeldt, chief engineer for the Baker Motor Vehicle Company, Cleveland, O., has sailed for Europe from New York and expects to remain about two months. Much of the time he will be absent will be passed in Germany, where he will enjoy a vacation, but he purposes to make careful investigation of recent European motor vehicle development before he returns.

STICKNEY IS DISTRICT MANAGER.

P. L. Stickney, who was formerly associated with the Service Motor Car Company, located in New York City, and who is one of the best known truck salesmen in the East, has joined the Palmer-Moore Company in the capacity of district manager and will have his headquarters in the Metropolis. He will have jurisdiction over a considerable territory outside of New York.

WILL MAKE TRUCK MOTOR GOVERNORS.

The Kramer Governor Company has been organized at Milwaukee, Wis., by Benjamin G. Kramer, J. W. Anderson and Max Gessler, with capital of \$125,000, to produce a governor especially designed for the control of truck motors. The company is established in the works of the B. G. Kramer Company, 243 Lake street, and will shortly begin construction of the device.

PRIVATE TAXICAB SERVICE.

Lord & Taylor, a firm operating a department store in New York City that is one of the best known of the leading commercial enterprises of the metropolis, has purchased two White taxicabs, which are to be devoted to the service of its customers. This is believed to be the first instance of a retail store installing cab service exclusively for the benefit of its patrons.

The offices of the Norma Company of America, maker of roller and ball bearings, were on April 11 removed from 2024 Vesey street to 1790 Broadway, New York City.

THE MOTOR TRUCK

Vol. V**MAY, 1914****No. 5**

The Publisher's Page

The realization of the enormous sums needlessly expended that can be annually conserved through change of methods, has directed the attention of the world to the possibilities of transportation economy, and those who have studied the subject understand that while motor vehicles are the means by which haulage can be best done, it will be necessary to systematize methods now the vogue.

By this is meant that the same condition obtains with reference to highway vehicle use that can be found with civilization generally. Betterment can only be wrought by organization and concerted action.

The motor vehicle, no matter how well constructed, is a failure unless so used that its possibilities may be realized. If the conditions of service are such that its speed and capacity cannot be utilized to the fullest degree the owner is the loser. He can control his employees and his organization, but he cannot govern the haulage of other concerns and individuals. There is no co-operation, no understandings that might be reached and no inclination to enter into engagement that might be remarkably productive.

The use of the motor vehicle has awakened the people, and those who sought to economize have learned that while they as individuals have decided limitations, it is well within the range of practicality to gain far greater benefits through systematization. This has been applied to street traffic to some extent, but those who are progressive understand that transportation to be highly efficient ought to be regulated with reference to each work, and that this means that schedules and assignment of definite hours for constant and variable haulage will be productive in largest measure.

Great industries and undertakings of magnitude have been made possible through organization and system. There is no reason why similar methods could not be applied to the use of terminals, piers and places where freight is received and delivered. Business requirements can be adjusted to conditions with comparative ease if clearly understood.

But the people must be educated, and this can only be accomplished through the instrumentality of the motor vehicle industry, which has, or can have, the organizations, the resources and the opportunities for disseminating public information. The result will not be what the people desire, but what the industry makes.

The MOTOR TRUCK is not a medium for circulating publicity that will benefit the individual only, unless this will be of material advantage to its readers. It is devoted to investigations of conditions that will not only be beneficial to the industry and the trade, but to the people of the nation. As a business man's magazine it deals with large problems, it investigates conditions with which haulage can be associated, and it reflects the best of all measures by which to judge—experience. Its promotive influence is very great, because it reaches the thinking men of affairs, who formulate principles and policies and have the ability and the forcefulness to apply them.

The MOTOR TRUCK is an authority on transportation by highway vehicle, and in promoting economies it necessarily treats of a diversity of subjects. The present number is an example of what each succeeding issue will be, and it will be as much better as is possible to produce it. Incidentally, this is a number worthy your very careful study. It contains the first system ever published by which actual work, operating expense, operating revenue, net earnings and actual value of equipment can be kept and accurately known to a day. This in itself is a work of decided importance. Examine it and draw your own conclusions.

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NO FENDERS IN MILWAUKEE.

OHIO LAW STILL "BUSTED".

The owners of motor trucks used in the streets of Milwaukee, Wis., will not need fender equipment for a considerable time to come, for the proposed ordinance requiring fenders was rejected by the city council. But this result was obtained largely through the activity of the officials of the Stegeman Motor Truck Company. All owners of machines operated in Milwaukee were notified by the letters sent out by the firm, and investigation of accidents in the city developed that only about 10 per cent. of the motor vehicle accidents were caused by trucks. Not only this, but in every instance injury was caused by falling between the front and rear wheels, which possibility could not be safeguarded by fenders. With these facts and that no practical fender has yet been produced, and maintaining that to require such equipment would be costly, unnecessary and would serve no good purpose, the company and its allies convinced the councilmen that the ordinance as proposed was worthless.

The Franklin County court of appeals of Ohio, to which the decision of Judge Kinhead that the Warnes law, which was to become operative in that state Jan. 1, was unconstitutional, was carried by the state, has affirmed Judge Kinhead's opinion as to unconstitutionality, and declared that the old motor law was in effect. As all decisions have been adverse there is doubt that the state will carry the case to the state supreme court. The court decided that the law was intended to produce revenue and was not for the control of motor vehicle users through the police power of the state. As two-thirds of the revenue raised by the law would go to the general fund the court decided this phase was unconstitutional. The law proposed to charge registration fees ranging from \$5 to \$18, according to the horsepower of the motors.

That part of the law which provides for the registration of manufacturers and for the licensing of all drivers was affirmed.

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Experienced users keep their trucks continually in service
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The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., JUNE, 1914

No. 6

MOTORIZED MUNICIPAL EQUIPMENT.

Changes from Animal Apparatus and Vehicles by States, Cities, Towns and Commission Administrations Result in Decided Economies, Largely Increased Efficiency and Materially Improved Service That Benefits the People.

MOTORIZED equipment is recognized as an absolute necessity for the public service of the nation, state or municipality, and is especially applicable to every municipal department, whether large or small, or whether devoted to safety, or protection of public welfare. But in addition to these the divisions that have work that may be regarded as routine in character, in which economy is a factor, can utilize motor vehicles for transportation with equally satisfactory results. One will admit that the necessity for economies is as cogent with municipal administration as with the private enterprise.

One might maintain that the needs of a community are proportionate to population, but when the conditions are analyzed it is apparent that the necessities are practically alike, the real problem being the number of units that will best serve. The service cannot be measured by dollars and cents in municipal departmental work, for the factors for judgment are vastly different than are those by which the business man determines his own requirements.

Economy is the principal basis for adopting motor vehicles or apparatus, but the saving may not appear in the expression of money values, nor in a given period of time. Those who advocate motorization are often at loss to demonstrate practically just what results will obtain. Conditions are not uniform and departmental requirements differ greatly. The view of the taxpayer may be concentrated on a money value,

but the real possibilities cannot be understood unless the future is considered.

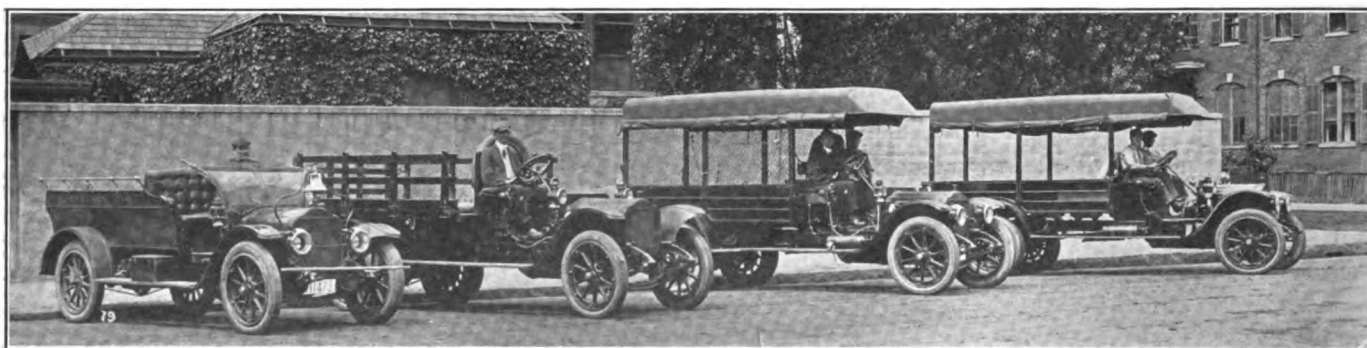
Considering a fire department as an example: The problem is the change from animal equipment with the least expense, and generally this is done progressively because of the large initial cost, which is



Delivery Wagon, 1500 Pounds Capacity, in the Service of the Massachusetts State Infirmary at Tewksbury.

in this manner carried through several years. But the greater degree of protection, without increase of stations, apparatus or men, means a great saving in department maintenance expense, and the suburban growth can be taken care of. Without any other change than of apparatus a town or city can increase its fire department efficiency 100 per cent.

The motor equipment can be used for many years,



Group of Wagons Used by the City of Boston: From Left to Right—Emergency Wagon of the Water Department of the Department of Public Works; Public Ground Department Wagon; School Committee's Transfer Wagon, and Truck in the Service of the Park Department.

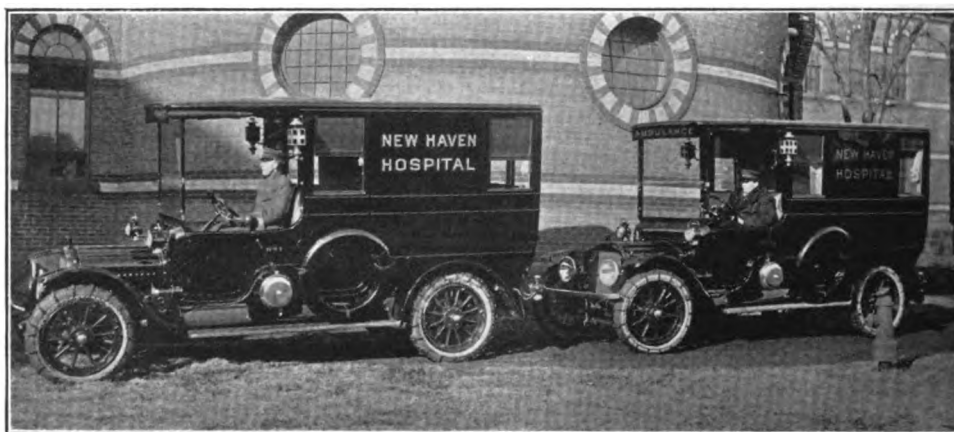
and the operating economy will pay the interest on bonds that will provide a considerable part of the expense, so that the initial cost may not necessarily be large. But were the operating expense larger there would still be the other factors for economy, which are too potent to be overlooked. The same statements will apply equally well to administration of police departments.

As to Converted Equipment.

Conversions and adaptations of animal equipment are practical, but are not as satisfactory as specially built equipment, and though having greater speed and reserve will not have additional capacity, which is usually a primary reason for making a change. Other municipal and state departments, which have to do with permanent improvements, construction, maintenance and the like, where the work may be constant or seasonable, require facilities that will serve all normal requirements and yet be adaptable for widely differing purposes. Where the service is variable the real need is convertible vehicles, which may be operated to the greatest advantage un-

der a considerable variety of conditions of service.

The extent to which municipalities have motorized their departments is seldom realized, even by those who have had occasion to make inquiry or investigation, and how cities and towns have adapted machines to practically every purpose is a study that



The White Ambulance Equipment of the New Haven, Conn., Hospital.

ought to interest every citizen, because of the undoubted advantages and economies.

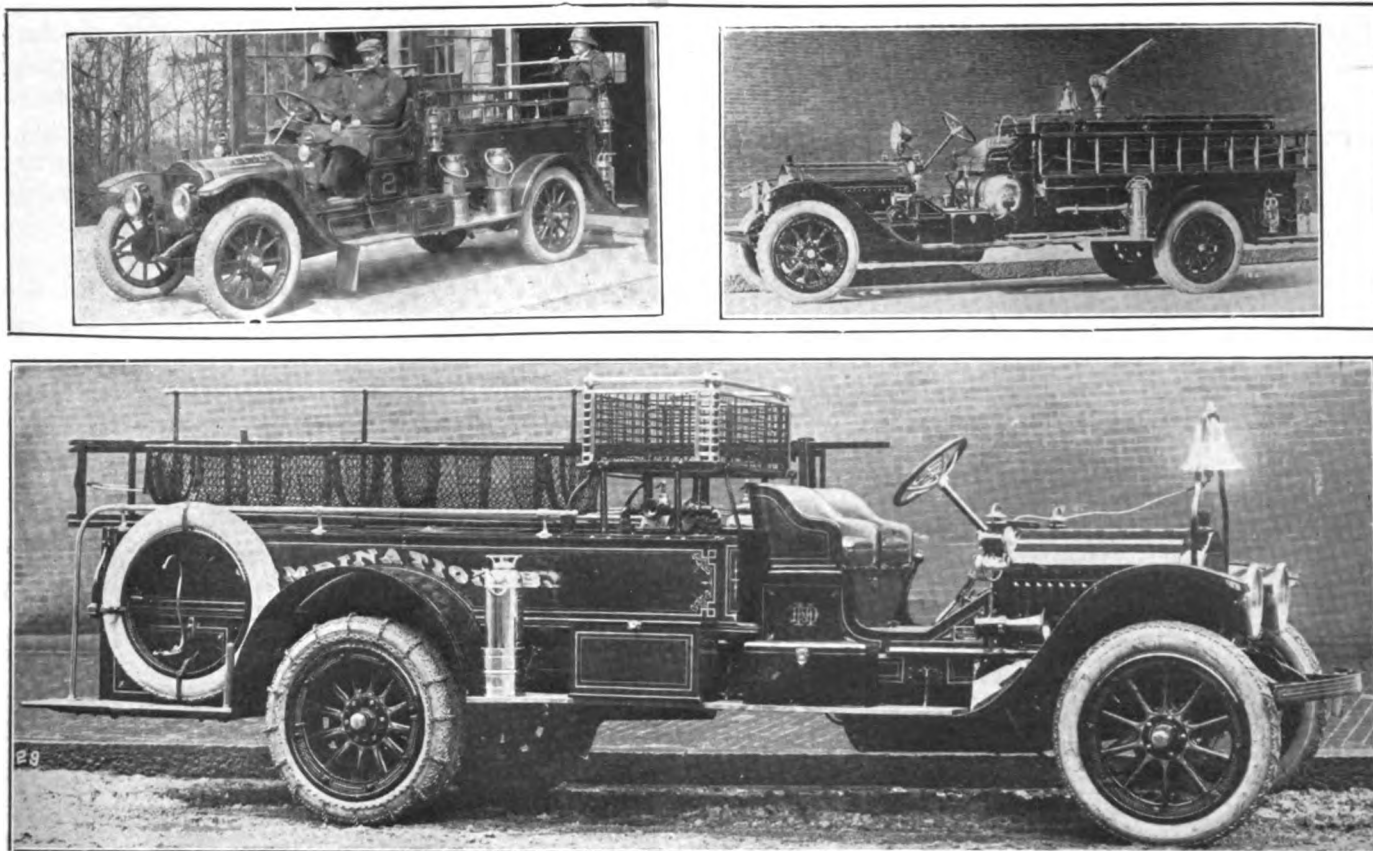
In Water Department Service.

The water departments of a number of New England towns and cities have used motor vehicles with decided success, obtaining a greater degree of satisfaction and lessening the expense to an appreciable extent. The Metropolitan water and sewerage board, which maintains the metropolitan park system in Boston and its suburbs, is a state body, being a division of the administration of the commission. This division has used a 1500-pound White wagon since Nov. 1, 1910. This is utilized for emergency work, carrying a force of men, with such tools and supplies as may be required, who repair water and sewer mains.

The metropolitan district covers a large area, and a great



Ambulance Owned by the Town of Webster, Mass., to Convey the Sick and Injured to Hospitals at Worcester, Mass.



Examples of Small City and Town Fire Apparatus: Upper Left Illustration, Squad and Hose Wagon at South Manchester, Conn.; Upper Right Illustration, Six-Cylinder 60 Horsepower Combination Chemical and Hose Wagon at Easthampton, Mass.; Lower Illustration, Combination Hose and Chemical Wagon at Malden, Mass.

deal of the time of the men would necessarily be required for travel were it not for the use of the White machine. In fact, before the use of a motor wagon several repair gangs were located in different sections, and with animal wagons they could not do as satisfactory or as efficient work as is now done with one gang and a single machine.

The Brockton, Mass., water department makes use of a 3000-pound White wagon that has been in service since March 30, 1913. Practically every kind of work is done, construction, repairing, installation of meters, etc., the workmen being carried from one job to another. The pumping station is at Silver Lake, 12 miles distant, and the machine is used for haulage of supplies as well as emergency trips. The wagon is fitted with tool boxes at either side, which also serve as seats for the workers. On the back of the driver's seat is a box that contains a card index showing the location of every meter and water gate and hydrant in the city, so that the foreman has immediately specific information relative to any work that he may be required to do. Up to June 1 it had been driven 6800 miles and the total expenditure for maintenance, aside from tires, gasoline and oil, was \$16.75. The statement is made that with the wagon two men do

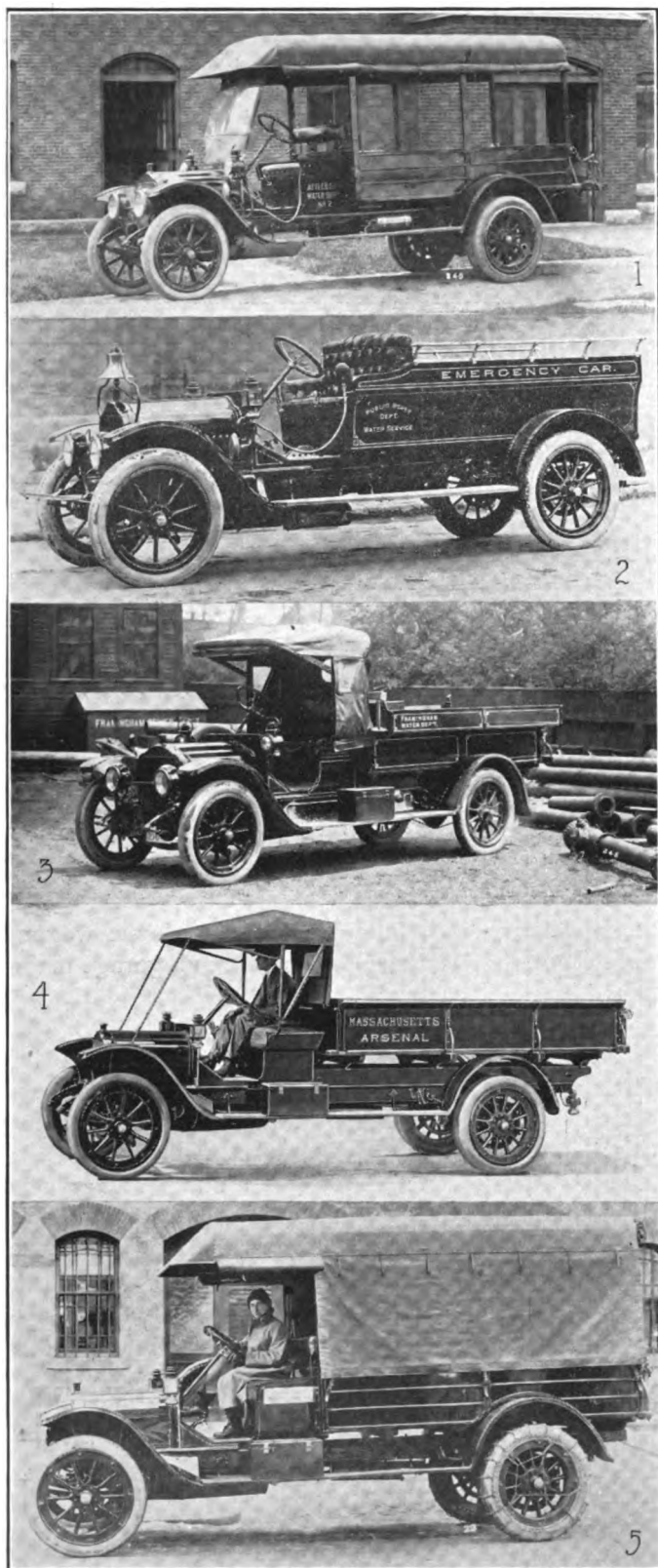
the work for which four men and two horse wagons were required. The machine is kept in a garage maintained by the department.

In Attleboro and Boston.

At Attleboro, Mass., a town that is about to become a city, a 3000-pound White wagon is used for practically all of the work of the water department, this being placed in service about two months ago. The town as now constituted has a number of villages from a half-mile to three miles distant from the centre, and all of these are served with water. The water mains cover a large area, and economy demands that they be maintained with the greatest economy. The use made of the machine is to take a gang and tools and supplies about, remaining with the men and economizing their time by quick trips between places where work is done. On the basis of mileage the ma-



The First White Specially Equipped Wagon, Built for the Boston Protective Department.



Types of Special and General Service Wagons: 1, 3000-Pound Machine Used by the Attleboro, Mass., Water Department; 2, Emergency Wagon of the Boston Water Department; 3, 1500-Pound Wagon Used by the Framingham, Mass., Water Department; 4, 3000-Pound Truck Attached to the Massachusetts State Arsenal; 5, Transfer Wagon of the Boston School Committee.

chine does not make a good showing, but judged by the superintendent of the department it is a great economy, for it has lessened the number of men necessary. The department used a ton machine for a considerable time before the White wagon was pur-

chased, it being replaced because it had not sufficient load capacity. This machine is kept at the department's garage and is maintained by its employees.

The Boston Public Works Department, water service division, uses a 1500-pound White wagon for emergency work, this being required to respond with a crew of men to fire alarms, and to all places where they may be required to control the water to prevent losses and damage from accident. Quick action is always necessary, the calls are frequently overlapping, so to speak, and the men are on duty day and night. The runs may be from a block or two to any distance served by the city's water service. The city is about 15 miles in greatest length, and approximately nine miles wide, and this area must be covered by the emergency crew. Obviously this work could not be done with so few men or so satisfactorily with any other form of conveyance. The wagon is equipped for carrying the tools usually needed for all work that the crew is expected to do.

The water department of the town of Framingham, Mass., has a 1500-pound White wagon that has been in service for about 20 months, and during the first 18 months the cost of operating the machine was \$1350 less than had been paid for haulage during the 18 months preceding the acquisition of the motor equipment. But in addition to this the report of Water Commissioner Arthur C. Winch stated that the time of transportation had been so much reduced that much labor that was formerly unproductive could now be regarded as productive. This saving alone was believed to be sufficient to cover the item of depreciation. During the first year the wagon was driven 7375 miles, used 1145 gallons of gasoline and 19 gallons of cylinder oil, and the cost of tires was \$228.92, including repairs, and the expense of repairing the machine was \$32.95.

Special Service in Lynn.

The water department of the City of Lynn, Mass., is extending a supply main to the Ipswich river in the town of Lynnfield, and this is being constructed of 36 and 30-inch iron pipe. About 7000 tons of pipe will be used. This pipe is brought to Breed's wharf by barge and landed by derricks, and it must be hauled and distributed along the line of construction. Each pipe section weighs 2.5 tons, approximately. When the haulage was estimated the possibilities for economy by purchasing and operating a motor truck as against a contract for the work were considered, and the department decided to buy a five-ton White truck, which was equipped with a winch driven by the motor. This winch consists of a cross shaft carrying a large bevel gear, which meshes with a pinion on a shaft mounted above the transmission gearset, this pinion shaft being driven by a chain from the gearset, which is used to drive the winch either forward or backward. The cross shaft carries a cable drum at either end.

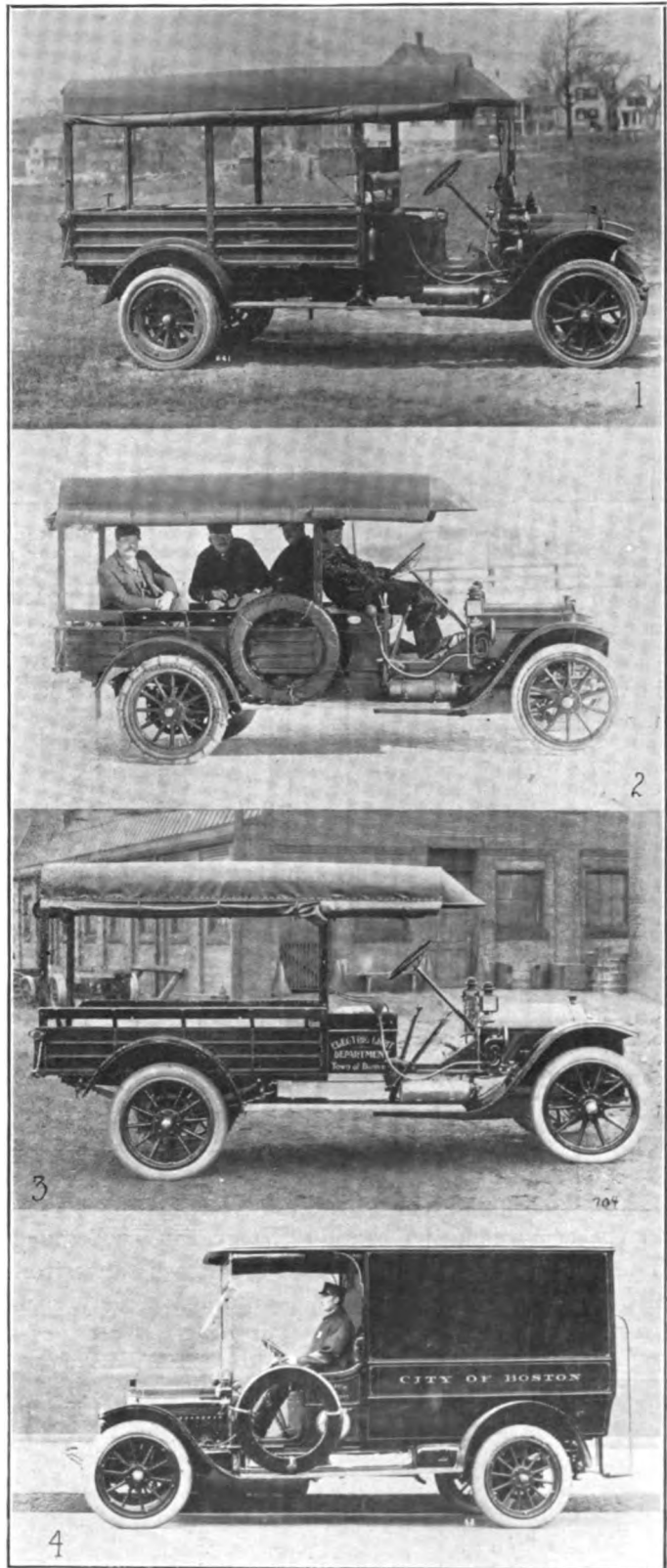
On the chassis is a platform with openings directly above the drums of the winch, and on the sides of the

platform are long rolls that prevent the cable binding against the side members. Midway of the platform, at either side, is a heavy hook that is used to secure a large single sheave block, and beneath the hooks are eyes to which the end of a cable is made fast. The platform carries two transverse bolsters. When the machine is loaded two iron-shod skids are placed from the ground to the platform, with the lower ends close to a section of pipe. The cable is secured to the eye on the opposite side of the platform, carried across the chassis and down and around the pipe, and thence back to the block, and then forward to and around the drum of the winch. The engine is started and so compounded is the power that the pipe is rolled up the skids to the platform and into place, one man merely guiding the pipe. The pipe is chocked with blocks secured by pins. Two pipe sections make a full load. On unloading the process is reversed.

Also Hauls a Trailer.

But the truck is required to haul a trailer. This consists of a large and high arched steel axle mounted on two very large wooden wheels. At the centre of this axle is fixed the end of a squared timber that serves as a pole. At the other end is a steel strap that carries a large eye. This serves to couple the trailer to the truck, a simple pin coupling being used. On the rear end of the pole is mounted a heavy cross shaft carrying two ratchet gears, and a lever arm that is extended by a long pole. On the shaft is a drum. The trailer is pushed with a wheel at either side of a section of pipe, a chain passed around the pipe and made fast to the drum above the axle, and by means of the lever the pipe is raised against the axle, this insuring sufficient road clearance. The lever is bound and the end of the pole lifted and coupled to the truck. Two of these trailers were constructed, so that one may be loaded while the other is on the road. This saves time loading.

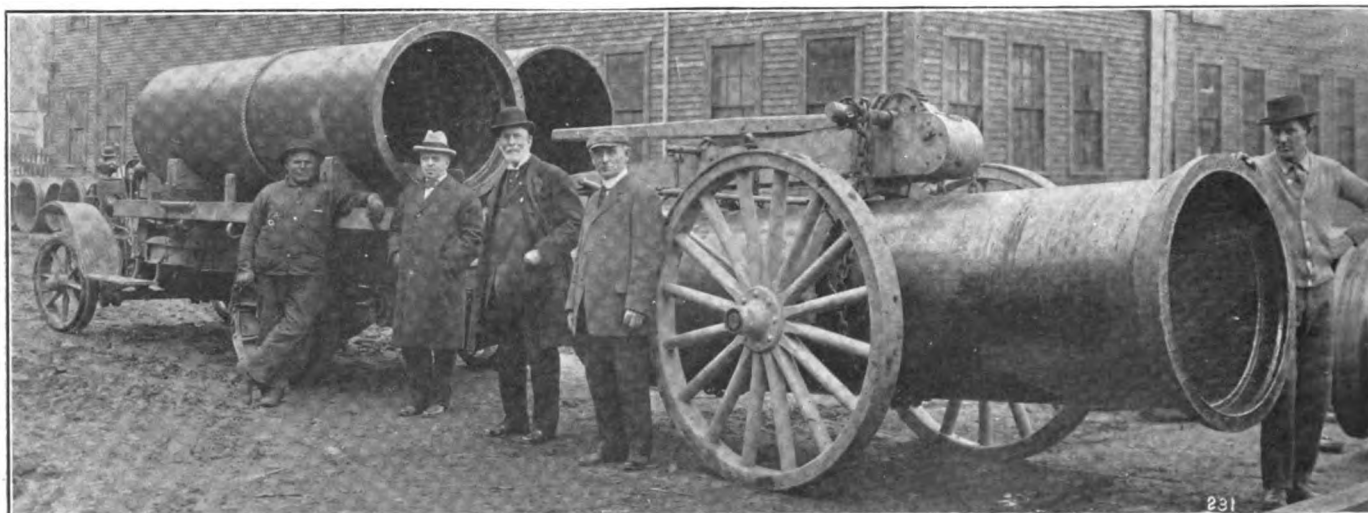
The haul will average about 4.2 miles. About 6000 tons of the pipe is 36 inches diameter and the other 1000 tons is 30 inches diameter or less. There was approximately 2400 sections of pipe 36 inches diameter, and with three to a load this represented about 800 loads. The truck has been hauling 18 sections a day on an average, or about 45 tons, and at this rate the work will be completed in about 133 working days. The smaller pipe will probably require about 30 days additional. With horses two loads could be carried daily and a team of four would be necessary to haul a similar load. The saving is estimated at 73 cents a ton, or \$5110 for the job, and this is more than the cost of the truck. When the haulage is completed the truck will be retained by the department and other uses, general haulage, made of it. By that time it will have more than saved its cost. The department now has two Federal wagons that are used for general purposes, and two touring cars. These are kept at the combination stable and garage of the department. As the police department has a patrol wagon and an ambulance, there is probability that a municipal garage



Machines in Hard Public Service: 1, 3000-Pound Truck of the Brockton, Mass., Water Department; 2, Emergency Wagon of the Metropolitan Water and Sewerage Board, Boston, Mass.; 3, Emergency Wagon of the Electric Light Department of the Town of Danvers, Mass.; 4, One of the 10 White Police Patrol Wagons Used by the City of Boston.

will be erected that will store the present equipment and have reasonable provision for increase.

The town of Danvers, Mass., operates a municipal lighting plant, and this department has used a 1500-pound White machine for about two years and a half,

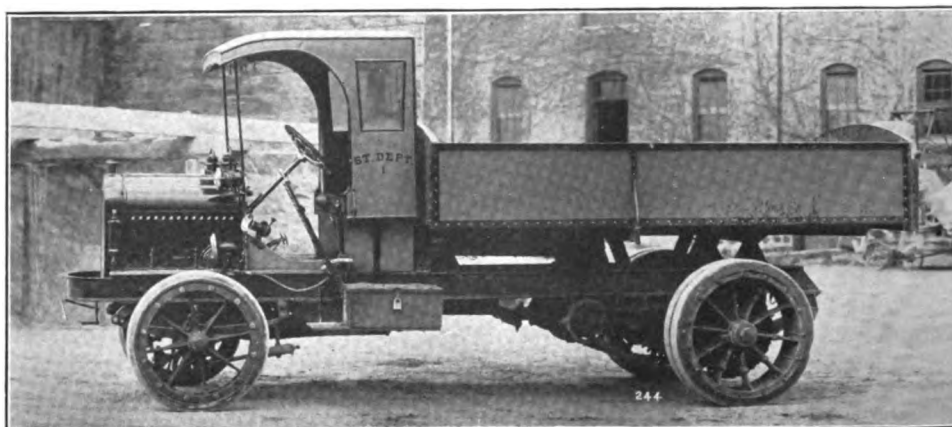


Five-Ton White Truck and Special Trailer That Is Now Hauling 7000 Tons of Water Main Pipe at Lynn, Mass., Saving More Than the Cost of the Machine in This One Work.

which has been used for all departmental purposes, construction, maintenance and emergency. It is necessary to utilize a single machine because of the town being comparatively small in population and with scattered settlements. The workers employed are few and while construction and maintenance are done by day, emergency work is necessary at night, so that the machine may be said to be constantly in use. Great saving is made in carrying material and the workmen, while for emergency service the repairs are made with greater rapidity and a much larger area served than would be possible with animals.

The State of Massachusetts has a 1500-pound White wagon in the service of the State Infirmary at Tewksbury. This is a large institution, located some distance from the town, on a hill with the buildings widely scattered. The machine was bought nearly three years

ago for general transfer work between the infirmary and the town, and it has been used practically all that time for conveying passengers to and from the station, making emergency trips to Lowell, and carrying

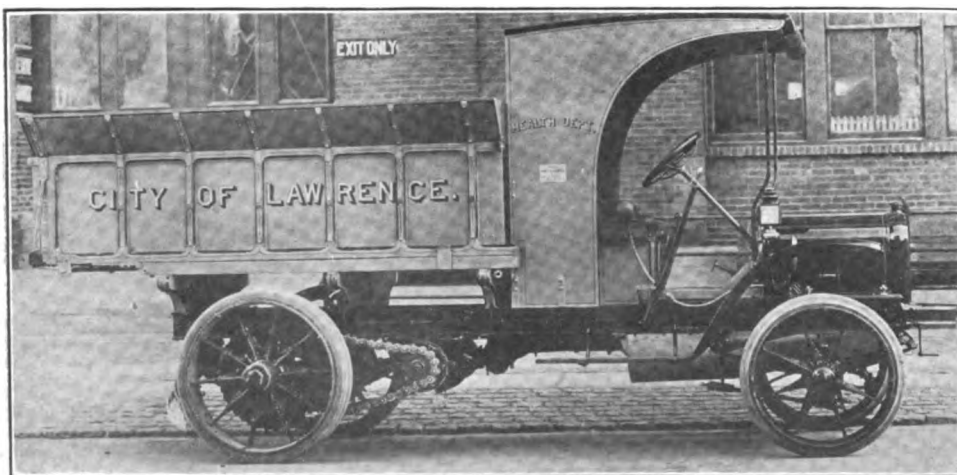


Five-Ton White Truck That Is Used by the Street Department of New Bedford, Mass., for Construction and General Haulage.

freight. There is a White touring car attached to the infirmary, as well as two small machines that are used for taking food from the general kitchen to the different divisions, a work that is done three times each day.

These machines are now kept in a garage, although for a long time they were stored in sheds and given scant attention.

The state has a 3000-pound White truck attached to the Massachusetts Arsenal at Watertown, which is used for the general haulage of freight and material, for the equipment and munitions for the state military organizations are distributed from the arsenal, and there is a great deal of transfer work between this store and the different points where the commands and state armories are located.



Three-Ton Dump Truck with Special Body Built for the Highway Department of the City of Lawrence, Mass.

The City of Boston has 10 1500-pound White chassis fitted with covered bodies that are used by the police department as patrol wagons, the first of which was placed in service about 2.5 years ago, and these are in constant service, giving satisfaction that is best demonstrated by the increase of numbers. Similar wagons are in service in Worcester, Brockton, Somerville, Milton, the Metropolitan district, and Woonsocket, R. I. These machines are adapted for emergency use as ambulances, having a small stretcher included in the equipment.

The City of Boston makes use of three 3000-pound wagons in the public grounds, school and park departments, these being in service that is more continuous and does not necessitate the hard usage that is inseparable from the fire and police departments. These machines are Whites. The city has a number of trucks attached to the department of public works and the health department, these being utilized for construction, maintenance, street cleaning, garbage removal, street sprinkling and oiling and other purposes.

In Hospital Work.

The saving of time in hospital work cannot be overestimated. In the event of accident or illness every second gained is valuable, and with this as a potent factor hospitals and municipalities are rapidly providing motor equipment. An example of admirable ambulance facilities is that of the New Haven, Conn., hospital, which has two 1500-pound White chassis fitted with splendidly equipped bodies. The service desirable for the town is illustrated by the ambulance owned by the town of Webster, Mass., for as there is no local hospital many persons, ill or injured, are sent to Worcester. The trains are not frequent, and to insure against delays and take patients to the hospital direct, without a transfer, as would be necessitated were they sent by train, the ambulance was bought two years ago. As a charity its purchase has been justified many times. When not in use there is practically no expense, and it is always ready for service.

In Lawrence, Mass., the street department of the city has a three-ton White truck with dumping body in constant use, and thus far the results obtaining from its service have been especially satisfactory. The street department of New Bedford, Mass., is using a five-ton White truck with a power dump body. This has been worked for about a year, hauling crushed stone where street work is progressing, and doing general work at other seasons. These are excellent examples of municipal equipment that will serve for general utility work.

In fire department service there are no machines that are given harder work than those of the Boston Protective Department. This is really a salvage or property saving division, that, while generally assumed to be attached to the Boston fire department, is maintained by the different insurance companies. There are four companies, located in different sections of the city, and one or more of them answers every

alarm of fire. This means that they must go to all parts of the city and speed is the real factor, for time is valuable beyond estimate. The runs are made as quickly as possible, and this means hard usage for the machines. But they are well maintained. Four special White wagons are used by the department, the success with the first resulting in additional orders. The city of Malden has a White combination hose and chemical wagon that has been in service for about two years. Excellent examples of equipment adapted for towns are to be found at Easthampton, Mass., and South Manchester, Conn., both of which have combination hose and chemical wagons mounted on White chassis.

HEAVY TRUCK MILEAGE.

The heavy truck that is driven an average of 35 miles a day is believed to be doing as large a mileage as can reasonably be expected, considering the time necessary for loading and unloading, but an experience with a Garford truck used by a contracting firm for a month, with 26 working days, is of especial interest in that it was driven during that time a total of 1592 miles. This was an average of 61.2 miles, or approximately 26 miles a day more than the average expectation. If the machine were driven continuously for 10 hours this would show an average speed of 6.12 miles an hour, and if the driving time were seven hours, this showed an average speed of 8.75 miles an hour, which is very close to the maximum that would be expected of a machine of this type.

The sales force of the General Motors Truck Company has been joined by J. L. Bergs, who was sales manager and superintendent of the Johnson Service Company's factory at Milwaukee, Wis., and was later associated with the Fritchle Auto & Battery Company, Denver, Col.

Assistant general manager is the title of W. O. Rutherford, who for four years has been assistant to H. E. Raymond, second vice president and general sales manager for the B. F. Goodrich Company, his appointment having just been announced.

J. H. Keidler, who was connected with the General Motors Truck Company and the Northway Motor Company, both of Detroit, Mich., has been appointed general superintendent for the Standard Motor Truck Company's plant in Detroit.

W. G. Tennant has resigned from the vice presidency of the Stewart-Warner Speedometer Company, Chicago, Ill., and will again associate himself with the Tennant Motor Company, of which he was founder.

The Universal Motor Truck Company, Detroit, Mich., has appointed Walter L. Jordan its western sales representative.

MOTOR GENERAL STORE.

Enterprising Greenville, Mich., Merchant Carries His Goods to Customers.

A mobile general store, that is moved about 50 miles each day, and which serves about 500 families each week, may appear to be a visionary proposition to those who are accustomed to do their buying at different places, and who indulge in "shopping" more from the satisfaction of curiosity than from actual economy, when the value of the time is considered. But as a practical enterprise, conducted by E. A. Eriksen, a Greenville, Mich., resident, the motor store has not only been profitable, but the service and convenience have attracted a very substantial and constant patronage.

Mr. Eriksen believed that if he were to sell goods at prices that would compare with the general market, and could make the deliveries in person to the people, he would at least have the advantage of dealing with them personally, and he could meet any requirements that might ordinarily be made upon him. Having a practical store experience he decided that a well diversified stock, such as might be found in a general store, that could be replenished daily and kept to a standard, would be attractive to customers.

He bought a Republic 3000-pound delivery wagon chassis and on this installed a body that is completely enclosed, having doors at either side to convenience handling, and with shelves, racks and bins for the storage of goods, all so arranged that while easily accessible a large diversity could be carried. The body is stoutly constructed, so as to afford the fullest protection, and all the doors may be locked when this is necessary. The roof of the body is surrounded by a pipe rail so that boxes or cases may be carried on it without possibility of loss.

The arrangement of the chassis is conventional

enough, but the body is decidedly unusual in its appearance, although not unsightly. Each morning the stock is brought up to standard, all kinds of groceries, provisions, fabrics and various articles of household use being stocked, and it covers a regular route, going into the country sections where time and in some circumstances conveyances are necessary to reach the stores. The machine stops for the different customers, who select and are immediately delivered their purchases, an average of more than 70 calls being made a day. Not only this, the motor store will buy certain fruits and vegetables, paying cash, which means that the farmer is able to obtain good prices without the necessity of marketing, a material factor at the season when time is particularly valuable.

Special orders are taken and filled when the next trip is made, and in this way the farmers are given a service they particularly appreciate. The demands for the visits of the store are surprisingly numerous, and the success of the business is limited only by the number that can be served. Financially the store has been much more productive than Mr. Eriksen believed, and while it has been quickly developed it has been demonstrated to be a very substantial and certainly a productive enterprise.

KNOX SELLING ORGANIZATION.

The Knox Motors Company, which succeeded the Knox Automobile Company, announces the appointment of George M. Davis as assistant sales manager. Mr. Davis was associated with the E. R. Thomas Motor Car Company of Buffalo, N. Y., and later was with the Pierce-Arrow Motor Car Company for four years, and recently he has been connected with the Packard Motor Car Company at Albany. Charles F. Barrett has been made advertising manager. The organization practically combines the sales and advertising departments.

Following the confirmation by Judge Morton of the United States district court for Massachusetts of the transfer of the property of the Knox Automobile Company to E. O. Sutton, the plans for production and selling were determined. The company had branches in New York, Boston, Chicago and Kansas City, and with the establishment of the company on a certain basis, the distributing organization will be developed broadly. Numerous applications for agencies have been received. Production orders have been given for a number of Knox-Martin tractors, fire apparatus, and latest model pleasure cars.



Republic Chassis Fitted with a Special Body and Stocked and Used for a General Store by E. A. Eriksen, Greenville, Mich.

ADAMS BROS. COMPANY EMBARRASSED.

The Adams Bros. Company, Findlay, O., maker of the well known Adams trucks, was, May 15, placed in the hands of a receiver, W. D. McCaughey being named by the court to administer the affairs of the concern. Because of business depression the company was embarrassed and a condition was reached where rearrangement of its finances was imperative. This was undertaken and there was reason to believe that the proposition would be successful, but just before the determination disagreements arose among those at interest as to the division of affairs, and this resulted in the petition for a receiver. No statement has yet been made relative to the assets and liabilities, and the future of the company is as yet uncertain.

LARGER "PHILADELPHIA" QUARTERS.

The Philadelphia Storage Battery Company's service station in New York City has been removed from 562-6 West 52nd street to 651-5 West 43rd street, this being necessary to meet the demands of the rapidly increasing business of the concern. The station occupies the entire ground floor of the building, this affording much larger area, and it is equipped with modern facilities for construction, repair and the charging of storage batteries, while there is a salesroom that is of sufficient proportions to display a stock of batteries of all types and sizes, as well as supplies of all kinds. The station is in charge of Walter L. Thompson, the New York City sales agent, who has offices at 1789 Broadway, that city.

MOTOR TRUCK FOREIGN TRADE.

The opportunities for export trade for American built machines, both for pleasure and for freight service abroad, have received the attention of numerous sales managers, and G. C. Frey of the Kissel Motor Car Company states that his concern has received many inquiries. He says in connection with this that he considers it as an indication that the American automobiles are not only being regarded with increased favor, but that the future will probably be bright for exporters generally. American business men are studying the methods of other nations carefully and the result will be a better mutual understanding. The interest evidenced in freight wagons and trucks is so large as to be decidedly surprising, which presages trade relations of a highly satisfactory character with many foreign markets.

MOTOR TRUCK STORE.**St. Louis Delicatessen Dealer Carries His Stock to His Customers.**

The Autocaressen is the name that William Goldstein of St. Louis, Mo., has bestowed upon the vehicle in which he conducts a novel business, or it may be that he has chosen this with a view of designating the business, but in any event St. Louis is the only city in America that can boast of a complete store housed in a motor truck. In the general acceptance of the public, delicatessen is understood to mean a store where food can be procured ready for the table, and such establishments, which originated in Europe, have become very popular within a comparatively few years. Where there is a considerable number of people of German origin such stores are numerous and many of them have very varied stocks, some specializing in imported table delicacies.

A delicatessen store is common enough, but when a man conducts one that moves through the streets when and where he will, serving all who may favor the general plan of having the store and its stock brought to their door, with as great a variety as might be found in a permanently located business, the proposition becomes novel from numerous aspects. One might assume that the volume of transactions would of necessity be large to meet the expense of operating, and regard the idea with material doubt, but Mr. Goldstein's experience has been that the people have taken kindly to the Autocaressen, and their patronage has been liberal and satisfactory.

The store is primarily a 3.5-ton B. A. Gramm's truck chassis, this being a standard construction, and on this is installed a body specially designed by the McCabe-Powers Carriage Company of St. Louis. The construction has a resemblance to the ordinary railroad dining car when viewed from the side, there be-



The Autocaressen, a Motor Truck Delicatessen Store Operated in St. Louis, Mo., with Much Success by William Goldstein.

ing a series of plain and ornamental sash windows rather high above the floor, with a sliding door with a glass panel about a third of the length from the forward end. This body extends from the radiator well back over the end of the chassis frame. The body is somewhat wider than the chassis frame, and at the forward end it fits over the fenders and the short running board. The front of the body is full width, with a series of windows, the lowest of which is just above the top of the radiator.

The roof of the body is a monitor type with a low hip in which are five windows on either side, and along the side edges of the roof are low rails. Because of the width of the body the front fenders and the running boards are well under the sides, but both are retained to secure the protection of the body from road mud and water thrown by the front wheels. There is a folding step at the side, by which the machine is entered, and handrails are at either side of the door. Centred over the rear axle is a low side window at either side, this being intended for display purposes, and a considerable assortment can be arranged within view of the customers who do not care to enter the body. The interior height of the body affords full head room for a very tall person. The windows are in part glazed with colored glass and with the highly ornamental finish the machine is very attractive.

The forward end of the body contains the driver's seat and the control levers and pedals, while the portion back of the seat is arranged for the storage of all kinds of stock and so that it may be carried without damage or loss, and in such condition that customers may inspect it before purchasing. The machine is sent over stated routes each day, the driver signalling the customers, who make their selections and receive their purchases immediately.

The practicality of the Autocaressen has been fully demonstrated by Mr. Goldstein, and it has proven to be a very profitable investment, although it would not be productive in all business enterprises.

The wholesale price of gasoline as supplied to garages is now 15 cents a gallon, this being established in different sections of the East about June 1, both by the Texas and Standard Oil companies. The Standard Oil Company's Pacific Coast price was at approximately the same time reduced from 16 to 15.5 cents a gallon. The high price, 17 cents a gallon, was fixed in January, 1913, and the first reduction was to 16 cents in November, 1913.

The Holtzer-Cabot Electric Company has begun the construction of a new six-story factory building in Armory street, in the Roxbury district of Boston, which will be completed and equipped early in 1915. The structure and the facilities will be of a character to insure the highest grade production and the greatest efficiency of the workers.

GMC ELECTRIC TRUCKS.

The General Motors Truck Company, Pontiac, Mich., has just published a new catalogue of the electric wagons and trucks built by its electric division, and this describes the distinctive features of design and construction of the GMC machines. These include the three lengths of chassis for each type of wagon or truck, which have capacities of 1000, 2000, 3000, 4000, 6000, 8000, 10,000 and 12,000 pounds, in which the batteries are carried on the chassis and in a compartment under the seat of the driver. Another feature is the flexible shaft drive from the motor to the countershaft, while in addition to this are the location of the controller, the safety switch and the ampere-hour meter under a hood in front, and the placing of the control lever in combination with the steering wheel, as well as the operation of both service and emergency brakes by pedals.

Following detail specifications, which are standard throughout, chassis dimensions for each of the three sizes are given, the prices of the chassis with Edison, Exide or Philadelphia batteries, and the approximate price of the different types of bodies that may be installed upon them.

The chassis dimensions, besides giving the proportions of the bodies that may be installed, include the wheelbase, tread, overall length, width of frame, overall width of chassis, height above ground when loaded, road clearance, allowable body weight and tire sizes, as well as the equipment that is furnished. The battery detail includes the makes, types, speed an hour, miles on a charge, length and width of battery boxes, and the prices of the chassis and battery, while the body data relate principally to the approximate prices of different types when installed on the different chassis, but do not include more than what may be regarded as standards. In addition the catalogue shows a number of different types of bodies that are in service, so that those desiring can identify the models and types that are illustrated.

The Allen Motor Company, Fostoria, O., has purchased the plant of the Atlas Manufacturing Company in that town, and the latter concern will locate its plant elsewhere. The Allen Motor Company has plans to build 5000 cars in 1915 and required greatly increased facilities. The Atlas plant was devoted to the production of crankshafts and parts, and this line will undoubtedly be continued.

The San Francisco branch of the Moreland Motor Truck Company, Los Angeles, Cal., is now in charge of George V. Lyons, formerly manager of the Alco Motor Sales Company of Los Angeles.

W. C. Hood, sales manager of the Standard Motor Truck Company, Detroit, Mich., has appointed as his secretary, J. E. Morgan, who was at one time connected with the Metzger Motor Car Company.

EXPLOITING MOTOR TRUCK FIELD IN CUBA.

THE exploitation of motor vehicles in foreign countries may be regarded by the executives of the selling organizations as being simply demonstrations of the qualities of machines, and this work may be believed as practical as it is in different sections of the United States, but there is a vast difference in the conditions to be met with, and those who have to do the actual pioneering or missionary exploiting find they are confronted with situations that require the greatest resourcefulness and knowledge to deal with them.

In European countries, where there are excellent highways, much better than the average of American roads, the great need is to convert the prospects to the qualities of the machines, because the manufacturers of Europe as a rule have material and workmanship that are excellent, and all motor vehicles are carefully finished. The American plan is to regard utility first of all and to place a secondary value on finish so far as it does not affect the actual operation or endurance of the wagon or truck.

But where the operating value of the machine has been proven and its qualities established, then comes the possibility of selling at lower prices through manufacturing superiority and quantity production. In countries where the roads have never been designed for economy in transportation, where time or labor are not regarded as having definite value, and where animals have been used for centuries, highway conditions are a very potent factor.

West Indian Road Conditions.

This statement can be applied very generally to the West Indian and South American countries. The railroad lines are comparatively few, and the means of transportation are limited to highways that are not

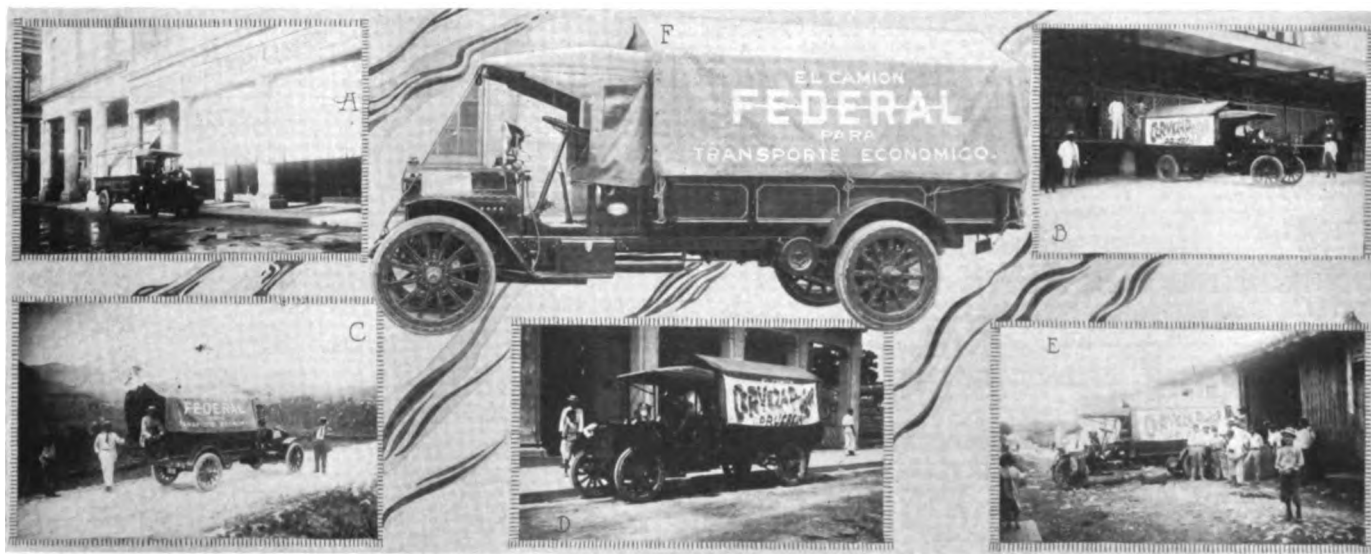
to be compared with roads in the United States. There are fairly good streets and some excellent roads within the large cities, but outside of these the highways are practically paths and trails on which the traffic is by saddle horse or occasional light vehicle, with heavy animal carts that carry comparatively small loads.

As may be assumed the motor wagon or truck can be utilized to good advantage wherever the roads are such that they can be driven to anything like the speed and capacity for which they are designed, but in many instances the men who undertake their exploitation must, in addition to the usual endeavor to disseminate knowledge of mechanical construction and transportation economy, begin a general education of the people with reference to highway development. To conceive what these men must deal with one must understand that the commerce is very largely carried on at the coast and on the banks of rivers that are accessible for vessels, and the interiors are not so easily reached, save by waterways and craft that would mean enormous expense for transporting were time and labor of anything like the value that they are in other countries.

The Situation in Cuba.

Cuba, since the independence of the island, has followed the initiation of the Americans, who developed many of the highways for military purposes, and there is now an excellent foundation for what will eventually be a complete highway system, and this will be of great economic value, for the railroads of the island have small mileage as compared with the United States.

For several months the Federal Motor Truck Company, Detroit, Mich., has had two men in Cuba, who have devoted themselves to practical demonstrations



Federalizing Transportation in Cuba: A, Federal Truck at the Establishment of E. E. Tolkadorff, the Havana Representative; B, Federal Truck at Loading Platform of the International Brewing Company, Havana, to Receive a Load; C, Machine on the Road from Havana to Pinar del Rio; D, Truck Ready to Leave the Plant of the International Brewing Company at Havana, with Special Signs on the Body; E, Loading the Truck in an Havana Street; F, the Truck as It Is Equipped for the Tour of Cuba.

of the work that can be accomplished with a 3000-pound Federal truck, and before their task is completed they will have well exhausted the possibilities so far as the preliminary exploitation of motor vehicles in the commercial centres is concerned. They have not only to interest and educate practical men who may engage in the distribution of motor trucks, but they have to lay the foundation for business that these men can later develop.

The Cuban exploration for business, for this term appears to be rightly applied, is by C. T. Chenevert, formerly assistant sales manager of the Federal Motor Truck Company, and Beckwith T. Havens, who is well known as an aviator with Curtiss aeroplanes, whose feat of flying from Chicago to Detroit, by way of Mackinac, during the summer of 1913 will no doubt be recalled by many.

Mr. Chenevert was Mr. Beckwith's business manager when the latter was giving public exhibitions of aeroplaning, and the two are close friends, as well as business associates. On making a tour of the island several months before they carefully noted the conditions, both in the cities and on the plantations, and found there were many opportunities for the use of motor wagons in the haulage of tobacco, sugar cane and sugar products, fruit and vegetables. These facts were stated to the Federal Motor Truck Company officials and this concern was impelled to immediately make an endeavor to develop business in the island.

Preparation of the Truck.

With this purpose in view a truck was prepared to meet the requirements of the men, who were commissioned to make a tour of the island to establish agencies and sub-agents and to practically demonstrate the advantages of the Federal truck in general haulage work. The truck was equipped with an express body, with a frame that might support a water proof cover, either to protect the loads or the occupants, and this was provided with the usual form of folding canopy over the driver's seat. It also had a tight fitting water proof top to cover the body frame, and means were provided for storing food, cooking utensils, clothing, bedding, etc., for the machine was intended to serve for shelter whenever circumstances necessitated, for there was reason to believe they would frequently be compelled to pass nights away from hotels and where they would be dependent entirely upon their own resources.

The purpose being to exploit the machine, on the cover was painted "El Camion Federal para Transporte Economico", which may be freely translated to mean "the Federal truck for economical transportation", and this is generally displayed, although special signs cover the sides when the machine is engaged in demonstrating work. Of course the sign serves the purpose intended, and does attract people wherever it is seen.

The first attention was given to Havana, where an agency was established with E. E. Tolsdorff, a dealer

in automobiles and accessories, and a number of demonstrations were made to pave the way for the activities of the agent. Then the crew began work in the western end of the island, crossing the mountain ridge and going as far west as Pinar del Rio, making sub-agencies in a number of the principal towns and cities and demonstrating the machine at the plantations of interested men. In Havana considerable demonstrating was done for the International Brewing Company, which has a very well equipped plant and which makes delivery at considerable distances from the city.

Relative to the drive to Pinar del Rio, a letter from Mr. Chenevert, written from Havana, briefly stated the following: "We got back here last night from Pinar del Rio after a very successful trip. Our demonstration load consisted of 10 barrels of bottled beer and five cases, each containing 16 dozen bottles. The total load weighed 4800 pounds. Please don't think that in overloading so heavily we were completely crazy, because we dropped half of this load at Guanajay, about 30 miles out, and the going most of the way was over good macadamized roads. The total run to Pinar del Rio was 118 miles. Our actual running time was 8.5 hours. We used 12 gallons of gasoline and 1.5 pints of oil. We took two days to come back, stopping at the towns en route to show the truck. There is an excellent opportunity to place some trucks with fruit growers, tobacco plantations and fisheries in this section".

The intention of the demonstrators was to start east from Havana and to go as far as Santiago, which is well toward the eastern end of the island, stopping on the way to give demonstrations in the largest towns and at the different plantations. When the introductory work has been accomplished and different prospects have been determined for the benefit of the dealers who will have agencies for the truck, the intention is to go to Porto Rico, where an agency will be established and such sub-agents secured as is believed advisable. The expectation is that the opportunities there will at least equal those found in Cuba.

In addition to the preliminary work in Cuba and Porto Rico, the Federal explorers are studying conditions as carefully as possible to obtain information relative to the possibilities for motor vehicle transportation for the use of the Federal company and its representatives in their future work. The purpose is to make a full report of the investigations when the work is completed.

The New York City service station of the Sears-Cross Company, manufacturer of speed indicators, has been removed to 218 West 65th street. The company's factory is at 147 41st street, Bush Terminal, Brooklyn, N. Y.

The Worcester Speedometer Service Station has been opened at 22 Commercial street, Worcester, Mass., in charge of A. E. Brown, this being a branch of the Stewart-Warner Speedometer Corporation.

GENERAL VEHICLE COMPANY'S PLANT.

Development Made with Plan That Comprehends a Mammoth Industrial Works, Designed to Be Ideally Productive and Standardized from Every Practical Aspect.

THOSE who regard the electric wagon or truck doubtfully when its practicality and utility are considered, who are inclined to regard the industry as uncertain and not well established, undoubtedly are not informed of the progress that has been made by some of the concerns that have been recognized as standard manufacturers of these machines. There are firms that have, since the productions were of sufficient numbers to be regarded as commercial possibilities, been engaged in manufacturing electric vehicles, and generally these have produced both pleasure cars and freight wagons.

The General Vehicle Company, successor to the Vehicle Equipment Company, which built its first wagon in 1900, and since that time has produced nothing but freight machines, has been developed to be a

very large factor in the industry, and what is probably the best evidence that can be demonstrated of the future of the electric car or wagon is the plans that have been determined and the progress made in development by concerns of this character.

Location of Plant.

The company has for a number of years been located at Long Island City, a suburban section of New York City, conveniently reached from Manhattan Island, and there it extended its organization as experience justified. The business the company has done in previous years warranted the projection of a vast plant that will eventually have a capacity of thousands of machines annually. The company has not confined its activities to electric wagons and trucks exclusively, but has made preparations to build a heavy gasoline truck that will be marketed for that class of work for which electrics will not be economical.

These machines have not as yet been placed in the market, and will not be produced commercially until well into the autumn or even the latter part of the year.

The fact that the mechanical vehicle has justified so carefully a developed enterprise is not surprising, but this concern has so planned that expansion will be provided for without in any way interrupting or retarding its productiveness, and systems and methods have been inaugurated that will be continued because of their practicality and economy, no matter to what

proportions the plant may eventually expand.

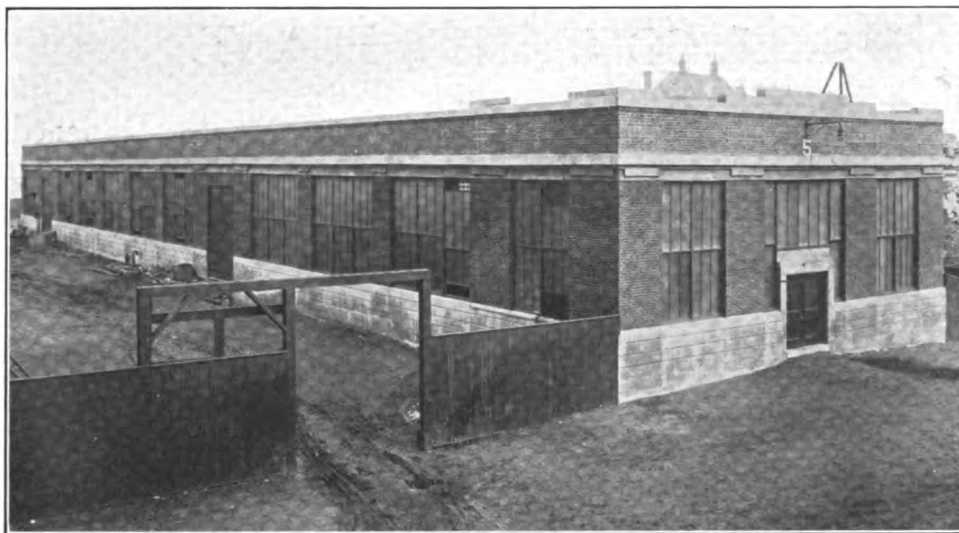
The provision made for the future is not based on supposition or theory, but on the experience of more than a decade and a certain knowledge of the requirements of the people for means for highway transportation. The building that was until last



The Six-Story Concrete and Steel Building Erected Expressly for the Construction of Electric Vehicles and Bodies.

December the factory, was built about 10 years ago, and when it had been filled with machines and workers and stock until the 90,000 square feet of floor area was so cramped that expansion was necessary in the interests of economy, the company decided on the construction of a very large building, two smaller structures, and such changes as were desirable in the old factory as would meet with immediate needs. In reaching decision, however, an ultimate plan for the layout of the works was determined, and the developments are details of that plan. The construction approved was that which would afford the best endurance and protection consistent with the investment.

The property consists of about 7.5 acres of land divided by a street, one portion being about 500 feet square and the other V shape and consisting of about 1.75 acres. The larger or the west yard at present contains the original building, which is one story in



Building No. 5, Which Has Been Built for the G. V. Mercedes Truck Department of the Company and Which Will Be Enlarged Later.

the centre under the monitor roof, and has a gallery at either side. Connected with this building is a structure about 50 feet square that was used for a battery forming department.

The ultimate plan for the factory comprehends four buildings in the larger or west yard, these to be about 75 feet wide and 500 feet length, from six to 10 stories, and a V shaped building in the east yard to extend along either side of the property, with a building about 100 feet square between the arms of the V, this to be a power plant.

Description of Buildings.

Considering the street between the two yards as a base for description, the buildings will be at right angles from this. The original structure (No. 2) and the new structure erected last year (No. 3) now occupy the centre section of the west yard, and eventually other buildings will be erected north and south of them, these being of the proportions stated, varying in number of stories. The most northerly structure will be No. 1 and the most southerly No. 4, this making up the layout for this yard, the buildings being now numbered to conform to this plan. Eventually No. 2 will be demolished and replaced by another of the same size as the others. These four buildings, of six stories, would have a floor area of about 900,000 square feet, or more than 20 acres; if of eight stories a floor area of 1,200,000 square feet, and if of

10 stories 1,500,000 square feet.

The arms of the V shaped building in the east yard will eventually be known as Nos. 5 and 6 respectively. The power house will be building No. 7.

The present building No. 3 was constructed practically simultaneously with buildings No. 5 and No. 7, but of these neither No. 3 nor No. 5 is completed to full length.

From the accompanying illustrations one will note the relative locations of No. 2 and No. 3 buildings, which are separated sufficiently so as to insure good lighting, the general plan providing for uniform distances between the

four structures in the west yard. No. 3, which is the latest construction, while not yet built to its ultimate proportions, is sufficient to enormously increase the capacity of the plant. The structure has been occupied since last December, although some portions of it were in use prior to that time.

In the East Yard.

Considering the east yard, building No. 5 is partly completed, and this is given over to assembling the G. V. Mercedes gasoline truck chassis, but this is intended, when finished, to be devoted to a gasoline engine testing department and the gasoline truck testing department. The other arm of the V will be part one-story and part two-story, the one-story section to be used for battery forming and the two-story section for battery assembling. In these the gasoline trucks will have engines installed and the electric trucks will have batteries installed. The power house is to be 100 feet square when finished, the boiler house occupying one half and the power house the other. But two bays have as yet been built.

The buildings are erected on made land and to provide a sewerage system the company was compelled to construct a sewer a half mile in length to the Newtown creek. In planning the structures the greatest care was directed to insuring complete protection against fire and to arrange the production so that there would



The First Factory Building of the General Vehicle Company, 100 by 510 Feet, Which Is Known as No. 2 in the General Plant Development Plan.

be minimum handling as the work advanced through the different shops. The No. 2 building was constructed of steel and concrete on concrete piling, the type being what is known as reinforced concrete, with carefully distributed load because of the character of the land. The first floor is designed to sustain a load of 500 pounds to the square foot, the second and third floors 200 pounds and the upper floors 150 pounds. The walls are brick curtain walls, supported at each floor level.

The building is thus utilized: The first floor for receiving, general stores and blacksmiths; the second for a machine shop, the third for assembling, the fourth for wood working and body building, the fifth for painting and trimming, and the sixth for offices and an exhibition room. The building is built to be thoroughly fireproof but in addition every square foot of floor area is covered with sprinklers, and besides this a city water main is connected with a large underground reservoir from which an electric fire pump can deliver 1000 gallons a minute. Fire mains are gridironed about the yard. There is a 50,000-gallon steel tank 30 feet above the roof, which is connected with the yard fire mains and maintains a constant pressure. The building is fitted with standpipes and these are equipped with hose at every floor.

Extreme care was taken in the development of the heating and lighting systems of the building to afford accessibility and economy of operation, the heating being by a vacuum return system, with high pres-



One-Half of the Blacksmith Shop of the Electric Department, Which Is Located on the Ground Floor of the Electric Department Building.

sure boilers so as to provide for possible future generation of electric current with by-product power. The power delivered by the power company is at 6600 volts, three-phase, 60 cycles on the two main feeders, and at 2200 volts, two-phase, 60 cycles on a single auxiliary feeder, the latter to provide a duplicate source of power for the fire pump. The fire pump will take power from either source.

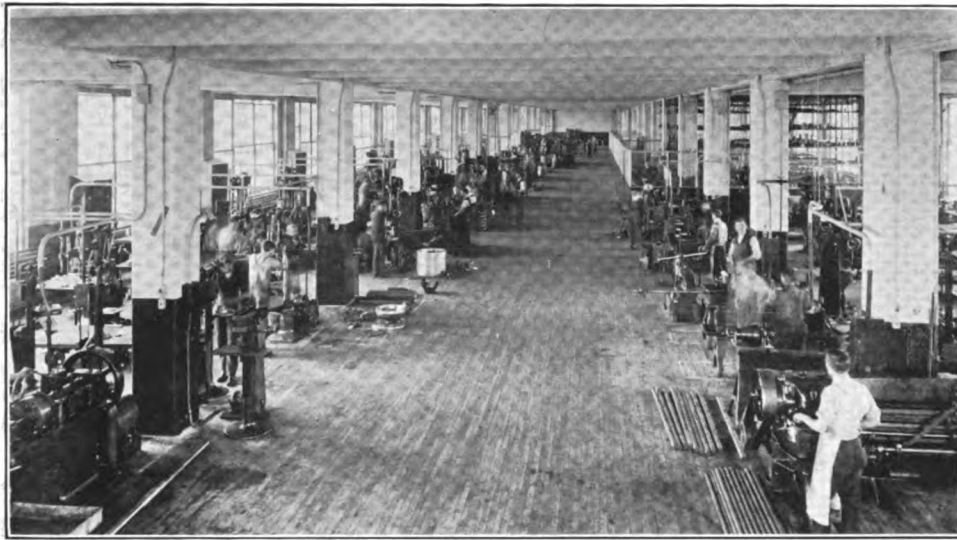
Provision for Power.

The company owns its own transformers, which consist of three banks, the one consisting of three 333 KVA transformers that reduce the voltage to 244 volts, three-phase, 60 cycles, and this current is distributed at this voltage through the works to all the motors. The second bank consists of three 111 KVA transformers that reduce the voltage to 122/244 volts, three single-phase, 60 cycles, and distributes the current throughout the works for all lamps, and the third bank of three 75 KVA transformers is installed at the fire pump and connects on the primary side to the 2200-volt, three-phase feeder of the power company and transforms the current to 244-volt, three-phase, this giving the same secondary as the other transformer.

All of the lighting and power wiring is carried through conduits with special arrangements for protecting it and distributing the current in a most economical manner. The lighting is such that no desk lamps are needed or allowed and no special illumination is required at the tools save in rare cases. Each machine tool is driven by its own individual motor, alternating current be-



A Portion of the Assembling Room in the Electric Division, Which Extends the Full Length of the Fourth Floor of the Building.



A Part of the Mammoth Machine Shop to Which the Entire Second Floor of the Structure Is Given Over, and Which Has Admirable Equipment.

ing used save where variable speed is necessary, when direct current motors are employed, these being driven by current supplied from a motor generator set. The feeders for light and power are run through porcelain tubes which run through the floor beams, so that they are never in danger of damage and there is free overhead clearance for the cranes and other equipment. There are 176 small motors having a total horsepower of 600, and about the same horsepower is utilized for larger motors that drive cranes, elevators, fans, pumps, compressors and motor generator sets.

There are four elevators in the building, one for passenger service to the offices and the other floors; a service elevator of three tons capacity that may be used for passengers or freight; a 5000-pound chassis elevator and a truck elevator with capacity of 7500 pounds.

In No. 2 building is a 15-ton electric crane controlled by an operator in a cage, and in the main aisle of the ground floor of building No. 3 is a five-ton crane that is used chiefly in the stockroom. Three-ton cranes are on either side of the aisles of the third floor for use in the assembling.

The policy of the company is to manufacture its own parts so far as possible, and complete equipment is installed for making the frames and machining all parts. There is no overhead shafting and each machine is driven by a 7.5 horsepower motor. In the blacksmith shop where the work will permit oil fuel is used.

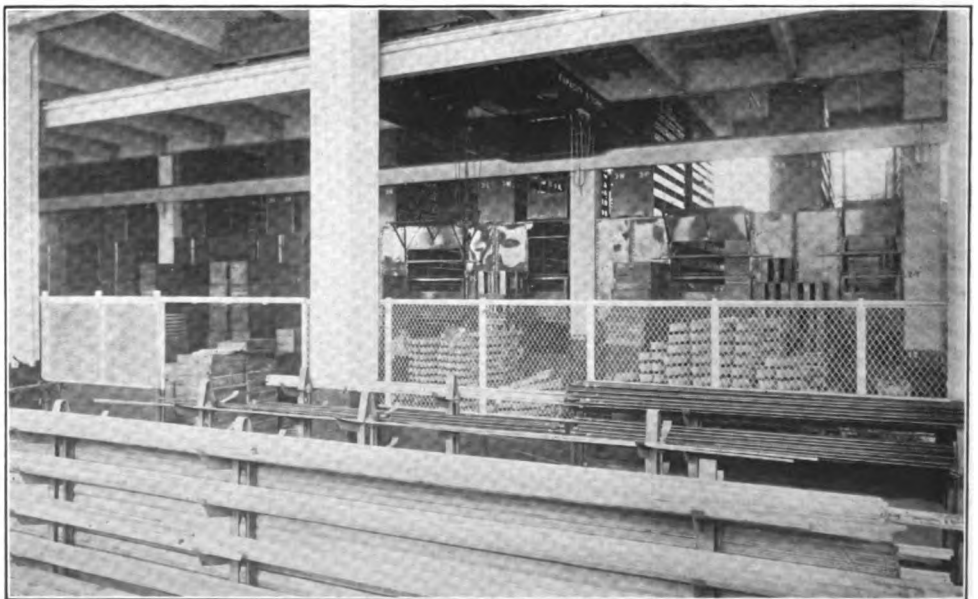
The sixth floor of the building, which is given over to the general offices, is laid out with

a vault 300 feet long in the centre. Besides this there is a suite of private offices for President Wagoner, his assistant and his secretary, a large board room, a private office for Vice President Wesley and his staff, a very large office for the sales department, and separate offices for the service, advertising, accounting, electric engineering, electric division superintendent, a spacious drafting room, private offices for the treasurer and secretary, a restaurant where the 150 persons composing the office force can obtain meals, with a large re-

serve room at the extreme end for expansion. The steel vault is divided into three sections, there being at one end the telegraph office, the telephone operators, and a general file room; further along the vault is devoted to the storage of correspondence, contracts, blue prints and general documents, and one section is to be used for expansion. All of the partitions are of glass and steel.

The keynote of the entire plant is system, there being standardization throughout, even with reference to keys, to colors of piping, and there is a standard design of work bench with a cast iron leg, while everything else is made of steel, this applying to bench drawers, foremen's desks, machinists' cabinets and all of the drawing cabinets, and all of the vault equipment is standardized. Complete record obtains of every detail, this including handling of tools, stock, etc., and inventories and examinations at periodic intervals establish conditions with absolute certainty.

The plant as it now exists is but a small part of



Section of the Factory Stockroom, Which Has in Its Equipment a Five-Ton Electric Crane with Which to Handle Heavy Materials.

what it will eventually be, but the administration has been arranged so that whatever is developed the systems will remain unchanged, and the expansion will be along lines that are positively known.

CITY WILL CONTROL 'BUS LINES.

That it is the intention of the City of New York to maintain control of the operation of motor omnibus lines that may in future be established in that municipality, was forecasted in a paper read by John A. McCollum, assistant engineer of the bureau of franchises of New York at the National Conference for City Planning held recently at Toronto, Can. Mr. McCollum specified the possibilities of motor omnibus lines in the Metropolis, and after dwelling on the importance of these from the viewpoint of city planning, stated that three new companies were desirous of obtaining franchises, while the Fifth avenue line purposed to extend its operations. One condition requiring careful attention was the duplication of some of the routes.

The statement was made that a franchise form is now being prepared which will reserve to the city the control of the operations of the lines, and this will be of a character that will fully conserve the interests of the public. Mr. McCollum stated conditions in some of the sections of the city which are not now well served with reference to transportation and told of some of the material benefits that would obtain with the development of systematic motor vehicle facilities. From the viewpoint of the engineer there are large possibilities and many neglected opportunities yet existing in New York for motor omnibus lines.

The Imperial Valley Transportation Company has been organized at San Diego, Cal., to operate a general freight haulage service between that city and Imperial, which will be inaugurated with six 2.5-ton machines.

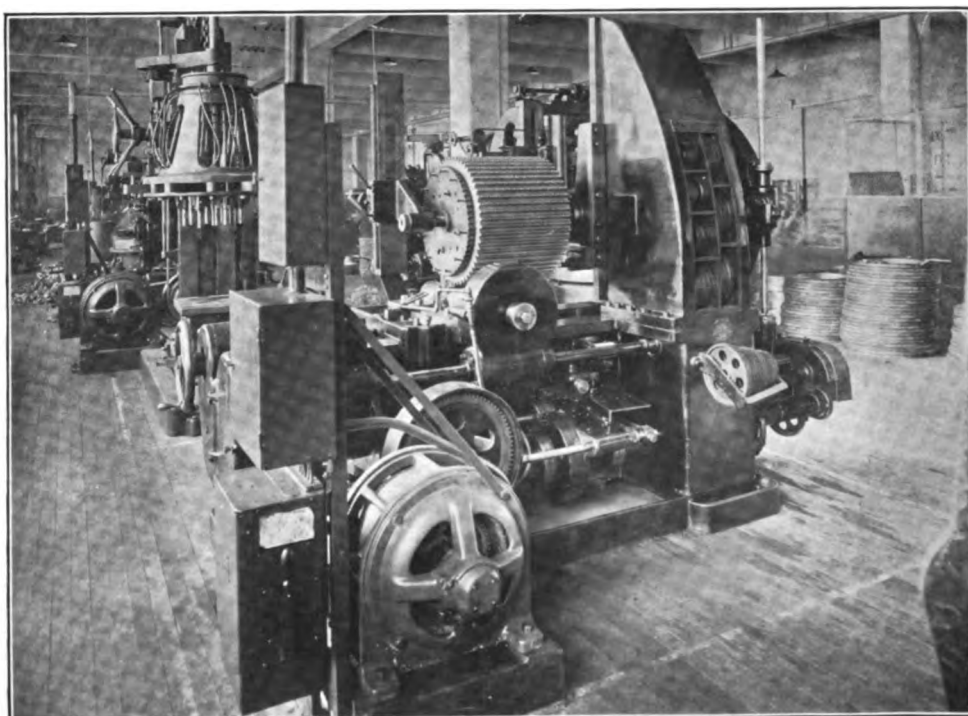
The Chicago, Ill., office of the Sheldon Axle Company was removed to the People's Gas building, at Michigan boulevard and Adams street, from 68 East 12th street, May 1.

With capital of \$125,000 the Reedsburg Motor Truck Company has been organized at Reedsburg, Wis., to build several sizes of motor vehicles.

WILCOX SIGNAL SALES MANAGER.

Howard Wilcox, who is widely and favorably known in the motor vehicle industry, has acquired an interest in the Signal Motor Truck Company, Detroit, Mich., and will serve as consulting engineer of the company and will direct the marketing of its products. Mr. Wilcox has had 13 years' experience in designing, building and selling motor trucks, and he has been identified with the building and distribution of Reliance, GMC, Kelly, Standard and Federal trucks, and his work has been of a very broad character.

Mr. Wilcox is credited with developing many of the features of the Kelly machines, and he also designed the Standard motor truck and organized the company that produces it. He was associated with the Federal Motor Truck Company as consulting engineer and was regarded as being thoroughly versed



Cincinnati Gear Cutting Machine, That Cuts 32 Sprockets Simultaneously, in the Fore-ground, and Back of It a Multiple Spindle Drill That Drills 14 Holes at Once.

in the creating and direction of successful sales organizations.

Mr. Wilcox believes that there is a very large market for a standard designed machine, such as the Signal truck, in that it has all the features of the larger trucks and is within the purchasing power of those who must consider price as well as economy and utility.

A great deal of activity in the motor truck market and resulting large sales, and many new agencies, were reported by Robert C. Reuschaw, sales manager of the Reo Motor Truck Company, during a recent tour of the Pacific Coast states.

D. M. Pettit has been appointed advertising manager for the J. I. Case T. M. Company of Racine, Wis.

ECONOMY OF KEROSENE FUEL FOR MOTOR TRUCKS.

THE fundamental principle of business is that, where competition is possible, prices are governed by supply and demand. This is, naturally enough, applied by all owners of internal combustion engines in which gasoline is used for fuel. The prevailing market price is accepted as the determining factor and little or no thought is given to the conditions of production. This is all well enough when pleasure cars are concerned, but with vehicles used for freight transportation, where constant operation and a considerable mileage are required, the price of fuel is well worth consideration.

Gasoline has the quality of vaporizing well, save in extremely low temperatures, while kerosene will not vaporize at less than 90 degrees Fahrenheit, and not readily at that point unless agitated. With gasoline engines starting is usually a matter of turning the crankshaft until a charge of gas is compressed in a cylinder, because the fuel will be sufficiently carburetted to create an explosive mixture, but when kerosene is used vaporization is impossible save when the temperature stated exists. With a warm motor, however, kerosene will give equal efficiency for ordinary requirements, and it has the additional values of being cheaper and practically non-explosive.

Aside from gasoline kerosene is the most logical and practical fuel. The supply is very much larger and with the constantly increasing use of electric lighting there does not appear to be reason to expect that the lamp consumption of kerosene will materially increase, though there are large possibilities for its use for oil stoves and heaters. A considerable quantity of American kerosene is now exported, and if the home market could consume this excess there is little doubt that it would be supplied in preference to meeting the demand of export trade.

According to satisfactory authorities the crude oils will vary greatly in the content of gasoline, but by combining gasoline and the naphthas approximately 16 per cent. of the best crudes will be useful for motor fuel. These same oils will yield about 50 per cent. kerosene, and the content will range from 40 per cent. to 50, so that a reasonable average is 45, or practically three times as much kerosene as gasoline and naphthas, the latter combination being what is now sold in the market as gasoline. The statement means that to produce one gallon of motor fuel three gallons of kerosene must be produced, and as the demand for gasoline is constantly increasing, and in greater ratio than for kerosene, the refiner faces the prospect of eventually making gasoline a very important product and obtaining for it a higher price, securing what is possible for the kerosene.

If the demand for gasoline warrants increase of price there is no doubt it will be exacted. Motor fuels cost much more abroad than in America, which has

led the motor vehicle manufacturers to utilize smaller engines, but to adapt them so that the power can be better applied. Many of the machines used in foreign countries would appear to be extremely underpowered when measured by the horsepower ratings of some American vehicles, but by the use of more gear ratios, and lower power reductions, extremely satisfactory service is obtained. The smaller motors mean greater fuel economy and equally satisfactory use from the machines.

Numerous attempts have been made to perfect vaporizers for kerosene carburetion. Some of these are fitted with attachments by which the engine may be started with gasoline and kerosene used as quickly as the motor is heated, others are designed to heat the kerosene to whatever temperature is desired to insure carburetion, and there are devices for priming the motor so it may be started. As a matter of fact practically any gasoline carburetor will sufficiently vaporize kerosene once the engine has been started, and the engine can be used without difficulty so long as it is not permitted to become cold. Many of these carburetors and attachments are thoroughly practical and can be used to material advantage, but their values are not understood or realized.

Prof. Benjamin T. Brooks of the bureau of mines of the United States Department of the Interior, is authority for the estimate that the production of gasoline in the United States is approximately 25,000,000 barrels of 42 gallons each, and the statement is that this production is less than the demand for fuel for internal combustion engines. This was not made with a view of influencing prices, uses or conditions, but it is significant than with the constant increase in the number of vehicles, yachts and power plants of all kinds the natural conditions will impel a shortage. Refiners cannot produce gasoline without manufacturing other products. Were gasoline the one product sought there would be of necessity corresponding production of kerosene, oils and paraffin, and these would accumulate in such quantities as would depress prices, for the surplus could not be stored for future consumption. Neither could the tremendous amount of capital that these products would represent remain idle. By this is meant that there is a limit to gasoline production unless the price is sufficiently increased to justify the sacrifice of what are now well established and dependable products.

There is no doubt that gasoline will be the prevailing fuel for pleasure cars, but kerosene is apparently the logical carburetant for freight vehicles. The supposition may be that gasoline is more convenient, and, at the present prices, the economy is hardly worthy of consideration, but today the price of gasoline in bulk will approximate 15 cents, and kerosene is nine cents. Considering the two as having practically the same

value as fuel, the saving by the use of kerosene will be 40 per cent. of the cost of gasoline, or 66 per cent. of the cost of kerosene, on each gallon purchased.

The following shows the savings that would be possible with the use of kerosene as compared with gasoline, with the prices that have been quoted:

Fuel Used Daily, Gals.	Gasoline at at 15c	Kerosene at 9c	Daily Saving	Annual Saving
20	\$3.00	\$1.80	\$1.20	\$360
18	2.70	1.62	1.08	324
16	2.40	1.44	.96	288
14	2.10	1.26	.84	252
12	1.80	1.08	.72	216
10	1.50	.90	.60	180
9	1.35	.81	.54	162
8	1.20	.72	.48	144
7	1.05	.63	.42	126
6	.90	.54	.36	108
5	.75	.45	.30	90
4	.60	.36	.24	72

The above is based on 300 days to the year, and this is not excessive, but whatever the number of working days the ratio will remain the same. The equipment for the use of kerosene may appear to be impractical to those who believe that it is necessary for a truck or wagon to have the same conveniences as a pleasure car. Where the machines are used in traffic a very general custom with drivers is to keep the motor operating at slow speed, which consumes fuel and naturally increases the operating cost.

Kerosene as a fuel is practical. Most all engines now in use will give very good efficiency with no other changes than a carburetor and a priming or starting installation. These are not expensive as a rule, and as indicated above the economy that might be obtained from them is much larger than might be believed without some consideration of the possibilities. There are other qualities of kerosene that are material, these including the minimum loss from handling or volatilization, and the greater security against fire.

The business of the spring department of the Lewis Spring & Axle Company, Jackson, Mich., has been sold to the Alloy Steel Spring Company, which is managed by Fred J. Keiser, who was associated with the Lewis company for a long time. The Lewis company has purchased the E. C. Clark Motor Company, Jackson, and will use the factory for the production of material that will be incorporated in the manufacture of Briscoe cars.

J. L. Elwood has resigned from the service department of the Remy Electric Company, Anderson, Ind., to become general superintendent of the Eureka Manufacturing Company, North East, Penn., and has been succeeded by J. D. Hopper, who was for a considerable length of time associated with the Hamilton Scale Company, Hamilton, O.

The New York City branch of the Gibney Tire & Rubber Company, Conshohocken, Penn., is now under the management of F. F. Phillips, succeeding J. F. Gibney, who has become a travelling representative of the company.

STANDARD TRUCK POLICIES.

Manufacturers' Committee Considers Need of Adoption by Builders and Agents.

The danger from endeavors to standardize motor truck design, and the possibilities of standardization, were considered at length at a meeting of the commercial vehicle committee of the National Automobile Chamber of Commerce at a meeting held May 26 in New York City, which was attended by W. T. White, president of the White Company, chairman; H. Kerr Thomas, assistant manager of the Pierce-Arrow Motor Car Company, and M. J. Budlong, president of the Packard Motor Car Company of New York.

The subject was discussed from various angles and it was agreed that there was a disposition with many engineers to establish standard designs, but wide differences exist in fundamental characteristics between the most successful and widely used makes of motor trucks and wagons, and an insurmountable obstacle to the standardization of such characteristics is the variation in working conditions and the kinds of work that these machines are required to do.

The committee reached the conclusion that the standardization of equipment, on practical lines, would be desirable and entirely practical, this being a detail that would be productive of much greater satisfaction.

The committee also discussed the possibilities for bringing about a clearer recognition of what constitutes reasonable and equitable service with reference to the attention that shall be given to motor trucks in the possession of owners. The opinion reached was that there was great need to have a better understanding and a closer adherence to the terms of the standard warranty, and that because of differences in conditions and practises there was seemingly no possibility of doing more than to define broadly what constitutes service in the general acceptance of the term. The adoption of a definition of service was left open with the understanding that a convention of motor vehicle manufacturers may be called to obtain the views of those who are chiefly concerned and to ascertain a precise basis for agreement.

A branch of the Newlite Manufacturing Company, Newton, Ia., has been established in the New York Life Insurance Company's building at Chicago, Ill., which will be devoted to the sale of the company's motor vehicle lighting systems in Illinois and Indiana. Another branch office will shortly be established at Los Angeles.

Announcement is made by the Royal Equipment Company, Bridgeport, Conn., that Raybestos, its standard asbestos brake lining, for use in light delivery wagons, will be sold with a guarantee of a full year's service, or replacement of the lining with new.

NOVEL KOEHLER "STUNT."

Delivery Wagon Circulates Carrying a Moving Grant Runabout.

A spectacle that has attracted no end of attention in the streets of New York City, and which will undoubtedly be seen in other cities, is that of a Koehler 2000-pound delivery wagon carrying a small runabout that is literally in motion, and the effect is made the more pronounced by a young woman seated in the roadster who has her hands on the steering wheels and is seemingly guiding it. From the viewpoint of the spectator the delivery wagon is converted into a float, this being done by the installation of a platform with skirts that drop a considerable depth the full length of the platform. On the platform is carried a Grant roadster that is finished in white, this making a striking contrast in the surrounding traffic, and in the seat of the runabout a young woman is generally seated.

The machine was first seen leading the annual actors' parade through the principal New York City streets, with Miss Stella Mayhew seated in the runabout, and thereafter it was driven about as a demonstration of the two. The accompanying illustration is a picture made in front of the Natural History Museum. The float was built by the H. J. Koehler S. G. Company, builder of Koehler wagons and eastern distributor of Grant machines. Patents have been applied for and much of the design and construction was completed by V. V. Kranich.

The runabout is mounted with standards beneath the axles which practically support its weight, but the moderately inflated tires rest upon two sets of two rollers which are mounted in the deck of the wagon. The rollers are coupled by gearing, and when exhibited the runabout engine is started and the moving rear wheels drive the rollers, and these in turn move the

forward wheels at the same speed. The high speed ratio is used and the roadster appears to be moving on the deck of the wagon. In addition the power taken from the rollers turns signs that are mounted in the skirts of the platform, these moving so long as the wheels of the runabout are in motion. Of course the wagon is operated independently of the pleasure car.

There is some probability that the exhibit will be sent across the continent, which event may be productive of desirable attention wherever it shall be seen.

AUTO SCHOOL CHARTERED.

The Stewart Automobile Academy of New York City has been established as a recognized educational institution of New York State, it having received recognition by the state board of regents, which determines the standing of all schools and colleges and fixes the standards of education. The academy for a long time sought to have its diploma recognized and after a considerable period of observation the board gave its approval. The school has been in existence for a number of years and has graduated several thousand students. It is said to be the first institution of the kind in the United States to be thus recognized.

NEW YORK TRUCK REGISTRATION.

During the three months ending May 1, 13,807 delivery wagons and trucks and machines rated as commercial vehicles were registered in New York State, which is indicative of a very large gain, for the total number registered during 1913 was 13,780. Of this number 8833 were registered in New York City, and 3524 were new machines, which, if taken as a basis, would indicate that practically 40 per cent. of the total registration was placed in service for the first time. The total registration in 1912 was 9806, and there was a gain of 3974 during 1913, or slightly in excess of 40 per cent. Thus during three months of 1914 the gain has been equal in percentage to that of 1913, and with the probable increase during the remainder of the year there is every reason to believe that the percentage will be close to, if not quite, 75 per cent. The motor trucks and wagons registered are about 12 per cent. of the total registration of automobile vehicles. With this as a basis there is probability that the total truck registration for the year will be very close to 19,000, and possibly 20,000.



Koehler Ton Delivery Wagon, Carrying a Grant Roadster and Miss Stella Mayhew, Which Headed the Annual Actors' Parade in New York City.

ELECTRIC VEHICLE PRACTISE.

Systematic Undercharging and Overcharging of Batteries to Minimize Gassing and the Deterioration of the Electrodes---Practical Treatment That Develops Capacity, Insures Long Life and Minimizes Current Consumption and Repair Cost.

By William W. Scott.

BATTERY charging can best be done by putting enough current into the cells and doing this with a minimum of gassing. Obviously, whatever current is used in excess of the required amperage is productive of gas that is liberated, which is a source of expense, and in addition to this there is the unnecessary wear upon the electrodes, so that there are two very logical and satisfactory reasons for care.

The positive plates of a cell may be damaged by overcharging if there be any abnormal gassing, but they will endure charging at low rates with very little deterioration. The negative plates may not be fully charged with the cell voltage reading 2.5, so one may understand that voltage does not always indicate plate condition. As a matter of fact long continued charging will directly benefit the negative electrodes, so long as there is lead sulphate to be reduced. If the sulphate is not eliminated the negative plates will not have full capacity and the battery will not have its rated efficiency, this resulting in a loss of work.

The requirements of the two electrodes are almost diametrically opposite, and by careful observation engineers have learned that the cells can be best protected by so charging that there will be little if any gassing, for it is entirely practical to minimize the effect upon the positive plates and by continuance of the method to thoroughly reduce the sulphate of the negative plates. For the reason that gassing will inevitably result when a certain condition has been reached, the necessity of reducing the amperage when there is a free liberation of gas is apparent.

The possibilities of systematic and careful charging are limited, but very high engineering authorities maintain that there can be an increase of at least 20 per cent. in battery life, and in some instances considerably in excess of this merely by exercising care and reasonable judgment. When one considers the possibilities for battery capacity falling below normal rating the very large saving that is practical is evident. It is not too broad a statement to say that by following a formula in the charging of cells one can insure from 15 to 25 per cent. useful work more than is claimed by the manufacturers. As this is absolutely clear gain there is the best of reason why the owner of a vehicle should obtain this service, and at the same time still further benefit by the minimum current consumption.

The battery man directing the charging should un-

derstand that voltage is not a constant by which to judge. There will be variation from several reasons, the age of the electrodes, the specific gravity of the electrolyte and the temperature, and observation is the greatest factor in attention. Gassing will follow when a condition has been reached, and when the amperage has been reduced the voltage will continue until a maximum has been reached and gassing is again evident. Or it is practical to reduce the amperage sev-

031-26-3 30M-8-11		CHARGING CARD.					
THE NEW YORK EDISON COMPANY.							
AUTO. DEPT							
PLUG NO. _____				BATTERY NO. _____			
DATE _____							
CAR NO. OR NAME _____							
PRESENT WATTMETER READING _____							
PREVIOUS DO DO							
DIFFERENCE _____							
CONSUMPTION _____							
A. M.			P. M.				
TIME	AMPS.	VOLTS	TIME	AMPS.	VOLTS		
REMARKS _____							

DAY CHARGER _____							
NIGHT CHARGER _____							

The Charging Record of the New York Edison Company, Which Will Show 12 Separate Entries of Time, Voltage and Amperage.

eral times and continue the charging over a long period of time.

It may be well to emphasize here what has been stated relative to "boosting", when high amperage can be used, that so long as the cell will absorb the energy without gassing there will be no untoward result—only when the gas is liberated freely will deterioration begin, but at this point "boosting" must posi-

NAME										ADDRESS										DATE																													
CAR																																																	
BATTERY										CELLS										PLATES										TYPE IN										TRAYS									
WHEN THE CELLS BEGIN TO GAS FREELY, REDUCE THE CURRENT.																																																	
SPECIFIC GRAVITY										ODOMETER										CHARGING RECORD																													
	DATE	OUT	TEMP.	IN	TEMP.	DROP	TOTAL	TRIP	TIME	AMP.	TIME	AMP.	GAS	TIME	AMP.	GAS	TIME	AMP.	GAS	TIME	AMP.	GAS	TIME	AMP.	GAS	TIME	AMP.	GAS	TIME	AMP.	GAS																		
	1																																																
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Form of Record for Gravity Charging Used by the Rochester Railway & Light Company, the Entries Covering Use, Mileage and Observations During the Charge, Each Sheet Providing for a Month.

tively cease, which does not mean that a charge is complete. Charging, however, is intended to completely restore the amperage capacity of the battery, and this is an entirely different proposition, for the energy must be supplied and the gassing prevented.

The experience has been that with the battery cell designed for the eight-hour rate, current supplied for approximately five hours at the starting rate, and continued from two to three hours at the finish rate, will meet the average requirement in a fairly practical way, but this is by no means certain or accurate. While it is true that a charge of from seven to eight hours will yield fairly good results, this does not mean that this will be ideally productive or protective.

The actual determining factor is maximum voltage, or, better still, gassing and specific gravity with voltage as a check. Final voltage will vary with the age of the electrodes, the new plates showing the highest, and there will be the temperature, which will have about the same influence on either old or new plates. Time is necessary in charging because of the necessity of reducing the sulphate, and this is especially true of the negative plates, where the capacity is absolutely dependent upon the condition. Forcing the charge beyond the stage where gassing is manifested affects the positive plates, which means that to restore the negative plates the positive plates are deteriorated.

The battery manufacturers have not agreed upon conditions of treatment of the cells. In some instances an overcharge is advocated once a week, in others once in two weeks, and occasionally once a month, but all are united in the benefit of the overcharge as a means of making certain that the sulphation of the plates is reduced. Batteries possess the same general characteristics, and one might assume that practise could consistently be the same with all, but while in a broad way this will hold true, it is also a fact that details differ essentially with each.

For instance, with the Gould cells the manufacturer specifies that the voltage readings should be taken every half hour during the period the battery is charging, and the charge should be maintained for a half hour after the voltage has remained stationary,

or reached its maximum. These readings must be taken while the battery is charging and at the rate specified. Equalizing of the electrolyte is advocated once a week, no matter what the service the vehicle is in, that the specific gravity be maintained as near 1.275 specific gravity as is possible. Recommendation is also made that the battery be given an overcharge once a week if used for freight service, and once in two weeks if used for pleasure, this overcharge to be continuance of the low final rate for from three to four hours after the battery has been charged in the normal manner. Equal stress is placed upon making a test discharge once every two weeks after the usual work for the day has been done by discharging at the rate of discharge specified in the catalogued rating until an average of 1.7 volts a cell has been reached. Such discharges necessitate voltage readings at intervals during the period of discharge, the record of necessity being that from the beginning of the observation until the average of 1.7 volts a cell has been indicated. Such tests may not cover a wide range, particularly if the vehicle is doing work well up to its mileage capacity, but the determinations are expected to be conclusive, for by the readings of a low-reading voltmeter and specific gravity the condition of any cell can be established.

The user of the Exide batteries is impressed by the maker with the fact that no additional mileage will result from excessive overcharging, and emphasis is made that any decidedly noticeable increase in temperature is a direct indication of such excess. Stress is placed upon the variation of voltage and recommendation is made that the guide be the maximum rather than a standard, while test of the specific gravity of several cells should be made near the end of the charge. By comparison of these with the voltage a very accurate check can be obtained. Though the specific gravity tests may not be taken each charge, the statement is made that each cell should be tested at least once every two weeks. Attention is directed to the fact that the input of current will be governed very largely by the output, but from 10 to 15 per cent. more will be required for charging than was discharged. Once in two weeks the charge should

be prolonged and continued for one hour after the gravity of the electrolyte has stopped rising. When such charges are given the battery cells should each be tested for specific gravity, uniformity being the principal purpose to obtain from such test.

The necessity of uniformity of charging is emphasized by the maker of Philadelphia batteries, and the statement is made that there should be careful observation of the rise of voltage and specific gravity, and that as these are approaching a maximum there is probability of a rise in temperature, which should not exceed 100 degrees Fahrenheit. Generally from five to six hours at the starting rate and from two to three hours at the finishing rate ought to be an approximate rule that can be safely observed, assuming, of course, that a battery has been normally discharged. The importance of giving prolonged charges periodically is stated with reference to this battery, the interval being two, three or four weeks, according to the service, and the charging being a continuance at the finishing rate until the readings of the voltage and the specific gravity show no rise for two hours. Recommendation is made that at the conclusion of the normal charge the specific gravity be noted of all the cells, and continued readings taken during the time the extra charging is in progress. These readings will be found useful for comparisons. Equalizing is advised after the prolonged charge.

The recommendations for the care of the LBA batteries, with reference to charging, include the taking of voltage readings every 30 minutes, the maximum being regarded as reached when there has been no rise of voltage for a half hour. But the desirability of checking the voltage by specific gravity readings is impressed upon the man in charge of the battery work, a pilot cell being used to obtain the ordinary charging specific gravity. A reforming charge is advised every two weeks, when the charge should be continued until the gravity of the electrolyte has stopped rising, but never for less than two hours more than the normal input, and specific gravity readings of all cells are suggested after the conclusion of the charging, as a final check of condition.

Considering the recommendations stated it will be noted that, while on principles the manufacturers are agreed, there is some difference in details, so that each make of cell ought to have specific treatment. The suggestion is made for the Philadelphia battery that when 75 per cent. of the battery life has been expended the specific gravity of the electrolyte be 1.275 maximum instead of 1.300, and the charging rate be reduced 25 per cent.

Probably one of the most interesting charging methods is that recommended by the chief engineer of a well known battery manufacturer, which involves a prolonged charge once a week, Sunday being suggested from the fact that the machine will probably not be in service, and this affords opportunity to do necessary work that is entailed with the system. This is intended to eliminate gassing, with its deteriorating influence on the positive plates, and to conserve the life of the cells, as well as obtain practically all reasonable capacity. For the utilization of this method it is advisable to have an ampere-hour meter, which will be of practical service during all charging.

The charging is started at a moderately high rate—not more than the normal six-hour discharge rate—and this is maintained until toward the end of the charge gassing is evident. Then the current is reduced so that gas will be no longer liberated, and continued until gassing is manifested. Then the process is repeated so that the current is gradually reduced and "tapered off" until about one-tenth of the normal discharge rate is reached, at which time the charging is generally terminated. In other words, the charging is maintained below the gassing stage until the battery is completely energized.

As to the current that will be necessary, this is somewhat dependent upon the previous discharge, but while a quick discharge will necessitate about 100 per cent. of the discharge in input, and a slower discharge perhaps as much as 110 per cent. input, an average will possibly be about 105. With the ampere-hour meter the input can be determined with decided accuracy, but without the instrument watching the gassing will be necessary. From this it will be evident that there

USE THIS SHEET FOR INDIVIDUAL CELL READINGS DURING OVERCHARGE AND FOR INITIAL CHARGE READINGS																				
DATE																				
TIME																				
TEMP																				
AMPERES																				
BY																				
CELL NO.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.	Sp. Gr.
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Reverse of the Monthly Record, Providing for the Systematic Observation of Each Cell of a Battery During Overcharging and Initial Forming.

will be but little more energy placed in the battery than was discharged, and if this is continued for six days the voltage for each succeeding day will probably be slightly lower, reaching the minimum the last day. The seventh day, however, the battery is given a charge in precisely the same manner, but the charging is continued until both the voltage and the specific gravity have risen to maximum and have remained there for a number of hours, this insuring the complete reduction of the sulphation and the restoration of the negative plates to the highest efficiency.

The practical benefit of this method is that the wear from gassing on the positive plates is lessened to such a degree that there is but little deterioration from charging, and as the positive electrodes are the most susceptible to charging influences they are effectually protected. The negative plates will be more or less sulphated because of the lack of the full charge, but they will be fully protected by the long-continued overcharge, and there will be no material diminution

increased reliability are considered, there is every reason why it can be adopted. As to its practicality, that has been established beyond a doubt. The claim may be made that the capacity of the battery is lessened somewhat each succeeding undercharge, which is undoubtedly true, but the normal standard is exceeded with each overcharge, and there is as a rule seldom more than 80 per cent. of battery capacity required in daily service.

The method can be applied to both thick or thin plate batteries with the fullest assurance of results, although with thick plates, where full battery capacity is required each day, the condition is more difficult to deal with. Thin plate batteries are as a rule easier to work because of the greater surface area, the better diffusion of the plates, the fact that the sulphate is thinner and more easily reducible, while with thick plates the sulphation is generally thicker and requires more current when charging.

Vehicle batteries are, however, as a rule, of the

thin plate type, because of the obvious advantages of these cells—greater capacity a unit and decidedly lighter weight. With thick plates the current required is greater in proportion to the capacity and the energy is more nearly used in daily work. Taken as an average the demand upon a storage battery is about 80 per cent. of its capacity, which will indicate there is a sufficient reserve for all ordinary requirements when the method that has been described is adopted. Considering undercharging and overcharging as specified, one will understand that while in principle

C. G. E. L. & P. CO. OF BALTO								Daily Charge Report		Date		beginning	
Car No. Plug No. V.	A.	Car No. Plug No. V.	A.	Car No. Plug No. V.	A.	Car No. Plug No. V.	A.	Car No. Plug No. V.	A.	Car No. Plug No. V.	A.	Car No. Plug No. V.	A.
12 M													
1 P M													
11													
12 NT													
1 A M													
10													
11													
Gas at end of chg.													
Temp. do													
Gravity do													
Wattmeter-Finish													
" - Start													
Signed _____												Battery Man.	

Daily Charge Report of the Consolidated Gas, Electric Light & Power Company, Baltimore, Used for One Vehicle Six Days or Six Vehicles One Day, Each Covering a Period of 24 Hours.

of capacity. In fact, the statement is made that battery capacity is developed through this treatment for a considerable period of time, as well as an assurance of a considerably increased life. The definite purpose is to undercharge for the protection of the positive plates and to overcharge at such frequent intervals that the sulphation of the negative plates can be effectually disposed of. Longer intervals between overcharges mean greater difficulty in dealing with the sulphated plates, and necessarily more careful treatment. In fact, the accumulation of several weeks might develop a condition that would be exceedingly troublesome when undercharging was continued.

Viewing this method from the aspect of economy it has much to recommend it, for by the elimination of gassing the cost of current is kept at the lowest point, which is a factor of considerable importance in daily service, and when the lengthened life of the battery, the certainty of lessened complications, and the

it is practically the same as is generally advocated by battery manufacturers it applies system, which does not require anything more than better supervision. By better supervision is meant the determination of the number of ampere-hours of current necessary in charging, and continued observation to insure reduction of the current whenever gassing is manifested. The ideal result would be daily charging without gassing and overcharging with the least possible gassing, and by the use of practical records there is no doubt that this could be attained.

With the ampere-hour meter very accurate determination can be made of the discharge from the battery, and with this knowledge the current can be supplied to the value that is justified by the time of the discharge, the range being from 100 to 110 per cent. of the current discharged, with approximately 105 per cent. for the average. This applies to the daily undercharging. The ampere-hour meter can be compen-

sated to meet any charging requirement. After a reasonable period of experiment one can determine the readings on the scale at which current can consistently be reduced to specific value. If the ampere-hour meter is not available one can practically note the voltages at which gassing may be expected, and reduce the amperage as the voltage rises close to these standards. Allowance must be made for variation of temperature and the age of the battery, which will have some influence upon the voltages, but these factors can be determined with satisfactory accuracy. With careful observation of the gassing, however, no other determinations are necessary.

In analysis of the system, especially where the charging is by observation and is not gauged by indicating instruments, it will be noted that this to a considerable extent parallels the "gravity system", in which the only indication is the reading of the ammeter. Reference has been made to this method previously, but it is well to state that it requires the constant reading of the specific gravity, which makes imperative the observation of the cells at very frequent intervals. For this reason examination for gassing can be made simultaneously with the gravity readings. There is no reason why systematic charging should not be applied equally well with gravity charging as with the other method, because the specific gravity readings are really reduced to voltage.

In any event a great deal is resultant from the continuous observation, and while gravity charging requires attention at definite periods—a fair average is a half hour between readings, the other entails the most care at the times when gassing is to be expected. While gravity charging is the exception rather than the rule, one very large central station has utilized it for a number of years with the best of success. In fact the statement is made, after experience with other methods, that it has been productive of the best results, and has been found to be the most satisfactory as regards to economy and battery endurance.

With reference to the character of records that ought to be used for charging, these should be as simple as is possible and include the necessary detail that is desirable to note. Several forms have already been indicated, but these are more or less general, although they might be practically utilized, with special notes of any condition that might arise.

The New York Edison Company, which uses considerably in excess of 100 electric wagons and trucks, has individual record of each charge given a battery in a vehicle, and the detail includes the charging plug number, the battery number, the date, the vehicle number, the present and the previous wattmeter readings, the difference between the readings (which indicates the current used for charging) and the current consumed. The card is divided so that there shall be no confusion of day or night charging, and the time of start, the amperage and voltage at the beginning of the charge and at intervals of an hour are noted

until the conclusion of charging, there being space for 12 separate entries of time, amperage and voltage, together with note of any fact that may come to the attention of the batteryman. The record is signed by the day or night charger.

This form is adapted for the ordinary attention, there being observation required hourly, which is believed to be sufficient to give satisfactory results. When one considers that a batteryman may have from 25 to 50 batteries under his supervision, the record is regarded as affording all necessary facts in regular work.

The Consolidated Gas, Electric Light & Power Company of Baltimore employs a record that is much more specific, this being a form that may be used for one vehicle for six days, or six vehicles for one day, but as a rule it is used for a single machine. This has a general heading that provides for the six entries of the car number and plug number, and columns for the noting of the voltage and amperage. Cross ruling provides for 24 separate entries in each of these columns, beginning at noon, so that entry may be made at the actual indication of time with reference to the sheet. This is believed to better illustrate the work, and record can be made of a charge extending over 24 hours. When the charge is concluded the entries at the foot of each series of two columns are filled, these showing the condition of gassing when the current was shut off, the temperature, the specific gravity and the wattmeter readings at the beginning and end of the charge. When used for a single machine each sheet will suffice for six days or nights, and these may be filed.

While specific gravity charging is not combined with the system that has been described in the practical work of any large installation, the gravity method is the practise of the Rochester Railway & Light Company, Rochester, N. Y., and the charging record used by that company is of special interest. Each form is designed to cover a period of a month, a single series of entries being made across a page each day. The sheet is filled originally with the name of the owner, the address or department, the name or number of the vehicle, the make, number of cells, number of plates, type of plate and number of trays in the battery. The entries note the specific gravity of the electrolyte when leaving and returned to the garage and the temperature, and the difference between the gravity readings; the total and trip odometer readings, and five separate readings of the time, amperage and the condition of the pilot cell with reference to gassing. On the reverse of this form is a record that is used for individual cell readings during overcharge and for initial charging. The sheet is ruled so that 18 different readings are made of each of 44 cells, showing the specific gravity only, and each column also indicates the date, time, temperature and amperes of each separate series of readings.

(To Be Continued.)

LARGEST HIGHWAY LOAD.

Long Train of Lumber Trailers Hauled by Single Knox-Martin Tractor.

The claim is made for the road tractor that with well designed trailer equipment a very large load can be hauled, and yet so far as experiments have determined there is a decided limit to the tonnage that can be drawn in practical work. In other words, there appears to be an extremely wide difference between what theory would dictate and what practise has proven is possible in average working conditions. One of the conditions that is extremely uncertain is the grades, and seemingly the load that can be drawn upon a level surface must necessarily be reduced as the percentage of gradients increases, while the character of the road surfacing is another factor of material importance.

Considering the variance of grades and road surface, it will be understood that the practical load is that which can be drawn on the heaviest grade or on the worst surface. But beyond this is the necessity of controlling a train when descending a grade or making a turn, and in some conditions for operation backing is quite as essential as hauling.

The Standard Lumber Company, Sonora, Cal., utilizes a trailer that consists of a platform mounted on a main axle and two large steel wheels. At the forward end of the trailer is a steel wheel that is carried in a yoke that has an arm extending beyond it, which is coupled to the tractor or the trailer ahead and which acts as does the pole of an animal vehicle, controlling the course of the trailer of which it is a part. These trailers are loaded in the yard and with the load supported by the third wheel they can be coupled and drawn about wherever desired, the unloading being accomplished by raising the forward end of the trailer so that the rear end of the load will rest on the ground. The tractor can then be drawn from beneath the load, or the trailer can be left and unloaded at convenience, it being picked up by the tractor later on.

The accompanying illustration shows a train of 12 trailers, each having a full load, which is believed to be

the longest train and the heaviest aggregate load ever hauled by a highway vehicle.

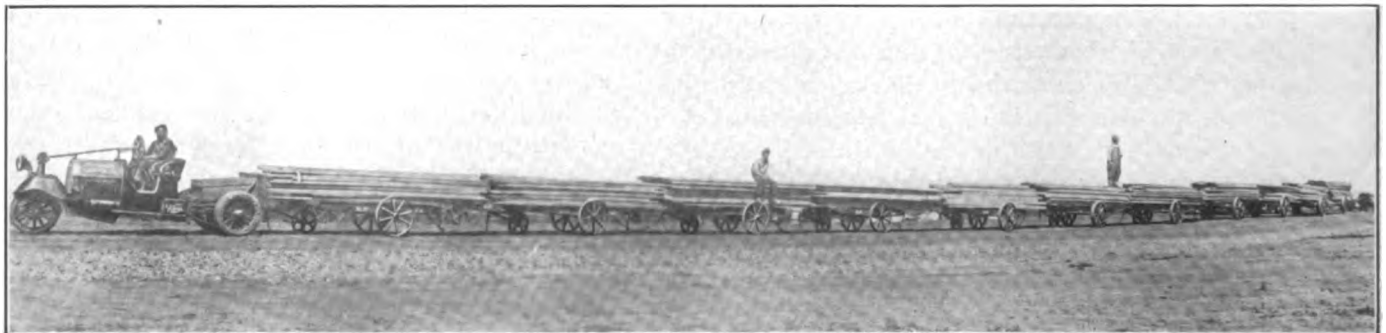
MOTOR TRUCK CLUB WANTS MEMBERS.

President George H. Duck of the Motor Truck Club of America has inaugurated a very active campaign to obtain members, with a view of extending the scope of the organization and to increase its influence, and has appealed to the members to enter its activities to a greater extent and promote the endeavors of the club in the numerous channels in which they lie. Mr. Duck points out that the usefulness of the club to the members is what they make it and its influence will increase with the growth. He shows that the co-operation and advice of the club is sought by legislative bodies, both state and national, and by civic organizations; that it is a factor in movements designed for the improvement of the conditions affecting the business of the members, and that its representatives are included in different associations and societies that have been created with the definite purpose of bettering highway transportation.

Each member is urged to secure one application for the month, and to not only get "value received" from membership, but to get all the benefits that are possible, and assist the other members to realize quite as fully from it. The officers want the suggestions and the criticisms of the members, and the approval of their efforts by the development work that will make it a much more potent factor than it now is.

The Smith & Watson Iron Works, Portland, Ore., has purchased the equipment of the factory of the Ajax Auto Tractor Company in that city, which indicates the termination of the activities of that concern. A great deal of money was spent for experimental work developing a type of gasoline truck, but only a few machines were built.

Garvin Denby, Edwin Denby and J. Walter Drake have disposed of their stock in the Federal Motor Truck Company, Detroit, Mich., and have retired from the corporation. T. R. Reader has been named as president, E. P. Hammond, treasurer, and Charles H. Mellish, secretary, to succeed the retiring officials.



Knox-Martin Tractor Attached to the Largest and Longest Train of Trailers Ever Hauled on a Highway, in the Service of the Standard Lumber Company, Sonora, Cal.

KNOX MOTORS COMPANY.

The Knox Automobile Company, which was recently purchased by E. O. Sutton of Springfield, Mass., has been succeeded by the Knox Motors Company, which has been incorporated with capital of \$2,500,000. This stock is divided equally into preferred and common stock and the organization has been completed by the election of Harry G. Fiske as president, E. O. Sutton as treasurer, and C. H. Beckwith as clerk. The new company took title of the property from E. O. Sutton, and announcement is made that it will continue the manufacture of Knox pleasure cars, Knox trucks and fire apparatus, and Knox-Martin tractors, it being the licensee for the production of the tractor equipment. The company has planned to increase its output to such extent as is necessary to meet general demands.

BUILDING ITS SIXTH UNIT.

The Four Wheel Drive Auto Company, Clintonville, Wis., has begun the erection of the sixth building of its plant, this being a brick and concrete structure, 40 by 80 feet, and one story, which will be used as a paint shop. This will be of saw-tooth construction and uniform with the other buildings of the plant. The completion of the building will give the company 46,000 square feet of floor space. The company owns 8.5 acres of land, its own sewerage system, water works, side tracks, heating and power plant, and the factory is equipped with modern facilities and equipment for manufacturing economy. The first building was occupied in August, 1911, and since that time the plant has been developed to its present proportions. The company claims that every machine that it has built is in service.

VULCAN TRUCK CATALOGUE.

The Driggs-Seabury Ordnance Company, Sharon, Penn., builder of Vulcan trucks, has just issued a new catalogue of Vulcan machines that is particularly interesting from the viewpoint of the business man investigating the quality and utility of motor vehicles. The catalogue is well designed and capably illustrated and printed, showing different types of machines, one a two-ton chassis, and the others two, three, four, 4.5, five and seven-ton trucks in differing services. In it is included comprehensive description of the components and assemblies, this detailing the constructional features, which are maintained to afford extreme length of life with a very large measure of economy.

TEACHING THE FARMERS.**Massachusetts Agricultural College Demonstrating with a Motor Truck.**

The Massachusetts Agricultural College, which is maintained by the state and is devoted principally to the tuition in agriculture, horticulture, dairying, etc., has for a long time given practical demonstrations of methods in different localities generally in co-operation with civic organizations and educational bodies, but has heretofore been forced to limit its activities because of the inability of the demonstrators to visit all of the communities where their services would be beneficial. The length of the season and the facilities for travel and the necessity of carrying apparatus and literature have been governing factors, and with the most favorable conditions many appointments that were desirable were given over because of the limited time in which this work can be done.

The college this spring purchased a motor truck and this was equipped with tree spraying apparatus, pruning tools, milk testers and dairy apparatus, account forms, literature and whatever might serve useful purposes, and this has been manned by a crew made up of members of the college faculty and students and has been sent about the state. Notice has been given to the communities to be visited and places for demonstrating appointed, and in this manner a very much larger number of towns has been served with practical illustrations of progressive farming. The farmers have the benefit of the lectures, demonstrations or personal conferences with the head demonstrator, and where time has permitted visits have been made to farms that advice might be based upon actual observation. So far as the work is concerned the institution has made possible a much greater diversity of tuition than would otherwise be possible, and the people of the state have shared in the results to a very satisfying degree. So satisfactory has been the use of the machine that there is a strong probability that another will be placed in service some time during the coming year.



The 3000-Pound Lauth-Juergens Chassis Equipped with an Open Express Body, the Latest Design Machine Produced by This Concern.



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Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

PRACTICAL TIRE ECONOMY.

One of the largest items of motor vehicle operating expense is that of tires. The average machine is seldom over-tired and often is fitted with shoes that are inadequate, especially when the overloading penchant of the owner or driver is considered. If a machine is to be continuously overloaded nothing less than large size tires is necessary, and while this will mean a greater initial expense, it will result in economy in the end, not only for tires, but the upkeep and maintenance of the mechanism.

Careless driving is the cause of a great deal of unnecessary tire wear, especially using car tracks for speedways, which is a very common practise with drivers when a vehicle is light. Wide tread machines are not entirely exempt, because one shoe can be kept in a track. Surface cuts and similar damage can be practically repaired at comparatively little expense other than time, and if attention be given to this work a material saving can be made.

QUICK LOADING EQUIPMENT.

Differing equipment has been devised for use with motor vehicles with the expectation of expediting handling of freights. Quick loading and unloading operations mean economy, or greater serviceability of a machine. But the most carefully developed or perfected installation will yield absolutely no results unless used with system or methods that will give the greatest service value. If the vehicle is to stand idle

the equipment is an unnecessary expense, unless the owner is considering the driver, but if saving of time is intended the only possibility is to carefully determine, even by experiment, the types and sizes that will be sufficient to do the work. Where the greatest saving can be made is generally in loading, for delivery as a rule is to varying destinations, where conditions widely differ, and frequently no time can be gained. To illustrate: If a power dumping body will mean an additional trip a day with a truck it is a good investment, but if it will not then a hand power hoist will accomplish exactly the same.

There are many ways of economy of truck time while loading. One is to have two or more interchangeable bodies that are loaded and placed where exchange can be quickly made. Another is to use crates or cages that can be placed in or taken from a regular body. Either of these means the packing of the load at the place of business by others than the vehicle crew. With such methods the saving of truck time must be of sufficient value to offset the cost of equipment and the additional help. Unless it can save the expense it is not justified.

MOTOR TRUCK SALESMANSHIP.

Motor truck salesmen, who are expected to consummate transactions sometimes amounting to large sums of money, are frequently criticised for what may apparently seem their lack of transportation information—that is, absence of precise knowledge of cost as applied to any given service. As a matter of fact business men expect them to inform them of data they themselves have neglected, but the salesmen are often discredited because they cannot obtain these details.

Salesmen cannot be expected to qualify as transportation experts. If they were capable of such work they would not be salesmen. The average business man has supreme confidence in his own ability to deal with situations without experience, and judgment made without careful investigation is frequently faulty. He regards the salesman as he does the representative of any other concern with which he deals, presenting qualities which he either accepts or rejects.

Salesmen undoubtedly profit by experience, and they can give the buyer the benefit of their advice, but the business man usually believes that he is capable of buying and often demands what is impracticable or which when utilized fails to obtain real economy. The real problem is to select the unit that will be the most productive in a given work, and this choice must be based on consideration of numerous factors.

Those who eliminate animal haulage entirely and consider possibilities by applying practical method and system that will utilize motor vehicles to the fullest extent of their capacities are not usually far wrong. Adaptation may be necessary as experience is gained, but once the right unit is selected its usefulness can be practically developed.

SPECIFICATIONS FOR PUMPING ENGINES.

National Fire Protection Association Takes Action Regarding Motor Apparatus at Its Chicago Convention--Other News of Municipal Installations and Equipment.

AT THE annual meeting of the National Fire Protection Association held in Chicago last month, George W. Booth, chief engineer of the National Board of Fire Underwriters and chairman of the first named association's committee on fire apparatus, submitted detailed specifications for automobile pumping engines. It would appear, as a result of the action taken by the convention, that those interested in motorized fire fighting apparatus now believe the essential features have been sufficiently well established to warrant standardization.

This situation is of particular interest to the automobile industry, since it is more or less well known that, while it was admitted by fire department officials that the gasoline pumping engine possessed qualities of merit, fire engineers were not inclined, until very recently, to give it their unqualified indorsement. Space does not permit of presenting the standardized specifications recommended, in full, but that portion having reference to the pump is as follows:

To be a piston, centrifugal or rotary pump, capable of delivering at least 700 gallons (or more, to suit requirements,) of water per minute against a net pump pressure of 120 pounds; it must be capable of delivering 50 per cent. of above quantity against a net pump pressure of at least 200 pounds. (If the purchaser desires a pump capable of operating against 250 pounds net pressure, add this clause: "And 33 per cent. against a net pump pressure of 250 pounds".) Pump must be able to deliver rated capacity with a 10-foot lift, and to take suction with a lift of 18 feet on dry pump.

Pump to be provided with the following connections, arranged as outlined: Two 4.5-inch suction inlets, with centre not more than four feet above the ground; removable strainer to be provided inside each inlet. Three 2.5-inch gated outlets provided with one-inch hose line drain cocks. One churn or hand relief valve; necessary piping to be not less than two inches internal diameter. One or more automatic relief valves. One or more pressure gauges on the discharge side of the pump, registering up to 300 pounds; to be provided with .25-inch standard pipe thread connection. A compound gauge on the suction side of the pump registering to at least 100 pounds and to 30 inches vacuum; to be provided with .25-inch standard pipe thread connection. Drain, air relief and priming cocks. Pump clutch and auxiliary throttle to be so located and constructed as to be operated from the ground or footboard. A safety lock to be provided to prevent accidental shifting of transmission gears while pumping.

The specifications also provide that the gasoline motor shall be capable of propelling the apparatus at a speed of 30 miles an hour, and of covering 20 consecutive miles in an hour over paved or macadamized streets having such grades as the apparatus is likely to encounter in service, when carrying the maximum load, without showing loss of power or overheating when propelling apparatus, and must be guaranteed to run not less than three hours continuously when pumping at rated capacity without showing loss of power or overheating.

Other details demanded are: Governor, limiting engine speed; two separate and complete ignition systems, magneto, spark coils, spark plugs and wiring system to be of water proof type, fully protected

against exposure; electric motor starter, capable of starting the motor at any time; not less than three forward speeds; two independent sets of brakes, one foot operated, either to be large enough to hold car on 20 per cent. grade with machine going forward or backing; not less than 30 gallons fuel capacity, to be in two tanks; positive force feed lubrication system, with circulating pump and filter, and with sight feed or gauge attached; splash lubrication not to be permitted in crankcase; clutch to be of such type as to operate smoothly under all conditions of road service without undue pressure on the pedal; clutches requiring constant lubrication of clutch faces not to be permitted; double chain or shaft drive to rear wheels; where chain drive is used, jackshaft to be of full floating type; tires to be guaranteed for 7000 miles to be run within a period of three years, not less than 36 by 4.5 inches forward and 38 by four dual or dual tread in the rear, and not less than S. A. E. standard dimensions, cushion or solid.

BROCKWAY MOTOR APPARATUS.

The Brockway Motor Truck Company, Cortland, N. Y., is announcing a line of motor fire apparatus, devoting its attention primarily to the moderately priced hose, chemical and combination wagons. The model V chassis is utilized, the combination outfit providing accommodation for 1500 feet of 2.5-inch hose, one 40-gallon chemical tank with 200 feet of hose, two three-gallon extinguishers, 20-foot extension ladder, 12-foot roof ladder, lanterns, pike pole, crowbar, axes, etc.

The motor is a 50 horsepower Continental, four-cylinder, water-cooled unit, with bore of 4.5 inches and stroke of 5.5. The transmission is selective, affording three forward speeds and reverse. Wheels are of the artillery type, carrying single 36 by 3.5-inch special cushion anti-skid tires in front and dual 36 by three-inch in the rear. The wheelbase is 120 inches and the weight 5000 pounds. The lighting system includes two 90 candlepower oil side lights, one tail lamp and a 12-inch acetylene swivel searchlight mounted on the dash, with Prest-O-Lite tank and electric lighter.

TO INCREASE TIRE LIFE.

George Hettinger, a chauffeur in the fire department at Albuquerque, N. M., has devised a simple means of raising the rear wheels of the motor fire apparatus from the floor in cases where it is not possible

to install relief jacks. This consists of a piece of iron, about 18 inches long, with a cross section resembling the letter T. The piece is laid on the floor with the tail turned upward and between the two tires. One is placed under each rear wheel, and the car is backed onto them. The tires are raised about a quarter inch, and the wheel rim rests on the T shaped section.

Hettinger is not the only member of the Albuquerque department with original ideas. A year ago last winter, when Chief Jacob Klein found trouble in keeping the water in the radiator warm, he made use of an electric coil to insure a quick start. For this the chief received praise at the New York convention of the International Association of Fire Engineers.

PATRONIZES HOME INDUSTRY.

Toledo, O., has taken the first step toward the elimination of the horse in its fire department, and it is not surprising that it should patronize home industry. An accompanying illustration shows the Willys Utility combination chemical engine and hose wagon



Willys Utility Chassis Fitted with Rebuilt Combination Wagon Body for Department in Its Home City.

made for the Toledo department by the Willys-Overland Company of that city. It may be added that the body equipment is that of a horse drawn wagon, which was transferred to the Willys Utility chassis at very slight cost, the sale of the horses netting almost enough to pay the bill.

The chassis is rated at 3000 pounds capacity, and is equipped with a motor having bore of 4.125 inches and stroke of 4.5, rated by the maker at 35 horsepower. The wheelbase is 144 inches and 36 by 4.5-inch pneumatic tires are fitted, single in front and dual in the rear. The new equipment includes electric generator and storage battery, electric side and tail lamps, electric horn and the front fenders. An electric motor starter may be fitted at a slight additional cost.

INSTALLS KNOX PUMP.

The fire department in Schenectady, N. Y., has just installed one of the new Knox motor combination pumping engines, after an official test in which the motor was able to deliver 105 gallons more than

the supply guaranteed by the maker. The machine was made by the Knox Automobile Company, now the Knox Motors Company, Springfield, Mass., and was delivered to Chief Henry R. Yates of the Schenectady department by William H. Gault, manager of the fire apparatus department of the company.

The engine was guaranteed to produce 600 gallons a minute. The test took place at a pond in the outskirts of the city, and while it was in progress a brisk wind continually interfered by breaking the stream. With one line of 100 feet of hose and a 1.375-inch nozzle, it threw 660 gallons, and with two lines, 100 feet each, one nozzle 1.375 inches and the other 1.25, it delivered 705 gallons.

Among those who witnessed the test were: Chief E. J. Shadwick, Saratoga Springs; Chief T. C. Colin, Cohoes; Chief John Mack, Glen Falls; Chief R. A. Maxon, Gloversville, and Chief W. C. Shepard, Pittsfield, Mass.

VANCOUVER'S FIRE EQUIPMENT.

The annual report of the chief of the fire department in Vancouver, B. C., shows that American made apparatus is held in high esteem in that city. The equipment consists of 14 horse drawn and 18 automobile pieces, the latter including two ladder trucks, eight hose wagons, one combination hose and chemical wagon, five chemical engines, one steam fire engine, a chief's car and one for the assistant chief. All are of American manufacture.

As a matter of fact, Vancouver is one of the first cities on the Pacific Coast, either in the United States or Canada, to purchase automobile fire apparatus. The initial machine was acquired in 1908, and since that time, whenever old apparatus has been replaced or the demands of the city for increased equipment has necessitated purchase, this class of apparatus has been added. It is also true that practically all of the equipment is of the latest approved type.

BUSINESS IS GOOD.

According to information current in financial circles, municipalities throughout the country are finding in the present condition of the money market very favorable opportunities for selling bonds, and, as a result, much city improvement work is under way in various sections of the country. This also appears to be a very opportune time to seek consideration of the purchase of motorized municipal equipment on the part of city boards, etc.

The Wall Street Journal is authority for the statement that the American-La France Fire Engine Company, Elmira, N. Y., is having the best business in its history, "which", says this publication, "is rather an anomalous condition with industrial plants just now". The report continues that the company is working

night and day at its factory and has been compelled to enlarge two of its departments.

A substantial portion of this concern's business is with municipalities, and it is stated that it has more than \$1,000,000 of such business on its books. The company has been very successful with its pumping engine, one of which is shown in an accompanying illustration, this being the machine which was subjected to a test in connection with the recent convention of fire engineers in New York City. It does not follow, however, that all of its business has been done with this type of machine, since it makes fire apparatus of all kinds.

NEWS FROM VARIOUS CITIES.

Buys Another American-La France—The board of engineers of the fire department in Lynn, Mass., has purchased a second American-La France combination pumping engine, to be delivered in October.

San Francisco to Try Whites—The board of fire commissioners in San Francisco, Cal., has purchased two six-cylinder, 60 horsepower White combination chemical engine and hose cars, equipped with electric lighting and starting system. This is the first time the San Francisco department has purchased machines of this make.

Ambulance for Atlanta Hospital—Superintendent Summerall of the Grady Hospital in Atlanta, Ga., has purchased a White ambulance, made by the White Company, Cleveland, O. This is the second machine of this make purchased for this hospital, the first having given such satisfactory service that it was not deemed necessary to advertise for bids in this latest instance.

To Motorize Present Equipment—The fire department in Westerly, R. I., has voted to purchase two automobile chassis, to which the body equipment on its present hose wagons will be transferred by members of the department. The committee in charge of the transaction is composed of Chief Samuel G. Cottrell, Harry S. Coyle, Francis G. Haswell, William S. Martin and Everett Barns.

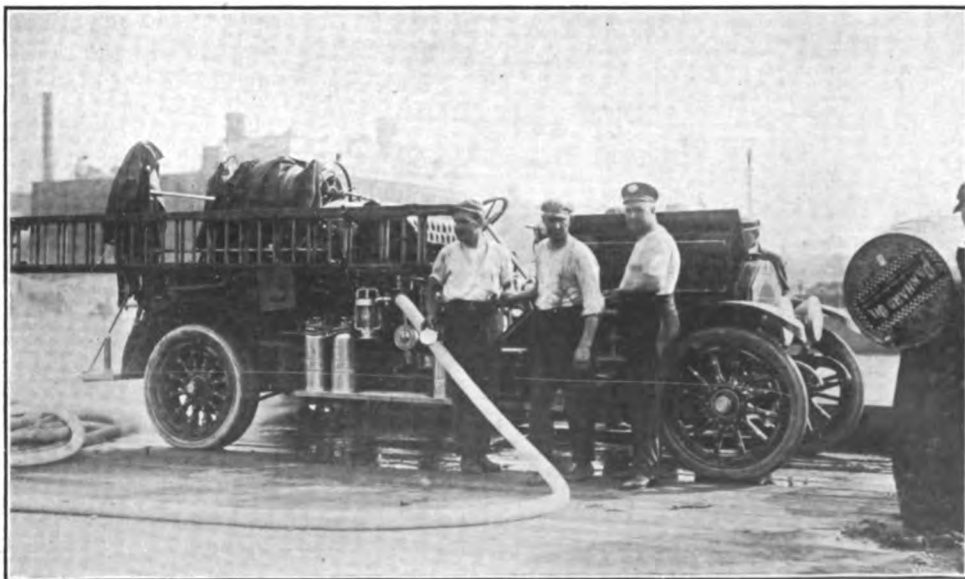
Willys Utility in Canada—Windsor, Ont., has joined the ranks of those cities in which the horse is being eliminated in the police department, having purchased a special Willys Utility patrol wagon, similar

lar in design to the 25 vehicles recently sold to the police department in New York City.

May Add Motorcycle Squad—The fire department in New Haven, Conn., is taking keen interest in the system so successfully inaugurated in other cities of having a motorcycle fire squad. The commissioners plan to provide machines equipped with chemical extinguishers, which shall be available for answering still alarms where there does not appear to be necessity for calling out the heavier apparatus.

Municipal Garage in Sight—Mayor Curley of Boston recently conducted an investigation, as a result of which the 78 automobiles owned by the city, outside of those used by the fire and police departments, will be housed in one garage at a uniform charge of \$15 a month. Heretofore, these machines have been garaged at several points throughout the city, paying from \$20 to \$30 a month. It is understood that the mayor is in favor of establishing a municipal garage, and formulating new regulations regarding the purchasing of supplies, etc.

In the Market—The following cities are considering the purchase of motor driven fire fighting apparatus: Freeport, N. Y., hook and ladder truck; Stroudsburg, Penn., chemical engine; Waterloo, Ia., hook and ladder truck; St. Johns, Ore., combination chemical engine and hose car; Clinton, Ia., hook and ladder; Moline, Ill., combination pumping engine and chemical wagon, two or three hose cars and a 75-foot aerial ladder truck; Dunkirk, N. Y., pumping engine; Tiffin, O., bond issue of \$13,000; Wagoner, Okla., combination wagon; Turlock, Cal., combination; Erie, Penn., appropriation of \$12,000; Montpelier, Ind.; Winona, Minn.; Belevide, Ill.; Wichita Falls, Tex.; Plainville, Conn.; Lansing, Mich.; Stillwater, Minn.; Muncie, Ind.; Butte, Mont.



Type of Gasoline Pumping Engine with Which American-La France Fire Engine Company Has Been Decidedly Successful.

PLANNING TRANS-ANDEAN MOTOR SERVICE.

National Governments of Chile and Argentina Asked to Subsidize Scheme, Following First Successful Trip From Coast to Coast in an American Pleasure Car.

RECENTLY, an American car, a Buick, driven by Johnson Martin, South American representative of the General Motors Company, successfully completed the first transcontinental automobile journey from coast to coast in South America. As a direct result of this history making trip, the national congresses of Chile and Argentina have been asked to subsidize a motor transportation scheme in which it is proposed to utilize motor trucks capable of carrying 17,600 pounds of freight and passenger automobiles with capacity for at least 12 persons each. There is every probability that the plan will meet with favorable legislative action, and that American manufacturers will be given the first opportunity to supply the vehicles which may be necessary to put it into operation.



Laguna Negra, at the Base of Mount Aconcagua, indicating the Scenic Beauty of the Uspallata Pass.

Johnson Martin began his trip in Buenos Aires, Argentina, and ended the journey in Valparaiso, Chile, 30 days later. The first portion of the route, to Mendoza, was across the so-called low lands of central Argentina. The remainder of the distance in that republic was covered by way of the Uspallata pass, the best known of all the passes over the Andes from Ecuador to Patagonia. Crossing the boundary at La Cumbre (the summit), the Chilean portion of the trip was by way of Los Andes and Santiago.

Road Through Uspallata Pass.

The pass virtually is entered, on the westward journey, at Las Higueras, and the road from that town to Uspallata is nothing but an old mule trail, upon which little work has been done since Gen. San Martin's army crept through the pass in its search for conquest sometime in the 16th century. However, the entire route has been in almost constant use for many years, since all the transmontane mail and passenger

traffic has been sent over it, whenever it has been possible to avoid the long sea trip through the Straits of Magellan.

At one point between Las Higueras and Uspallata, the Buick was able to make but 2.5 miles in four hours, and Martin and his mechanic, Otto Johanson, were forced to abandon the attempt and spend the night on the rocks. In the morning they were able to proceed along the bed of a dry river.

Soon after leaving Uspallata, the trail begins its ascent to an extreme elevation of 12,500 to 13,000 feet, and the peak of Aconcagua towers above it, 23,392 feet above sea level. During this portion of the trip the car was accompanied by two horses, until one of them fell into a canyon and was killed. In places it was necessary to carry the machine across bridges, which had been built only for mule traffic and were not wide enough to permit it to pass. On the way to Cortaderas it required 26 hours to cover one kilometer, and in several instances the car had to be turned on its side, the men pushing it along as best they could, because of the narrow path.

Chilean Roads Are Good.

Upon reaching La Cumbre, it transpired that practically all of the difficulties were ended. The roads on the Chilean side of the pass were found to be well kept and quite in contrast with those on the Argentine Andean section. This condition prevailed all the way to Los Andes, and between that city and Santiago splendid time was made over some of the best highways in South America.

The successful completion of this trip attracted widespread attention throughout the entire world, and particularly among the business men of Chile. Numerous previous attempts to cross the Andes, utilizing this pass, had been made, and it would appear that business interests had been awaiting the opportunity to inaugurate plans for the development of better transportation facilities for this district.

Details of the Plan.

The scheme to which reference already has been made was projected by Wiedgan & Cia. of Valparaiso. It contemplates the establishment of an automobile transport service between Los Andes and Mendoza, a distance of 148 miles. The Chilean Trans-Andean Railway would take care of the transportation between Los Andes and the Pacific Coast, while the Argentine Trans-Andean Railway would connect Mendoza with Buenos Aires. While these two railways are subsidized by the governments whose names they bear, they are operated by a private concern known as the Buenos Aires & Pacific Company.

It is proposed that the two governments shall subsidize the new venture on a capital of 750,000 pesos (about \$273,750). In addition, the Mendoza provincial



Punta de Vacas, on the Road Between Argentina and Chile in the Uspallata Pass of the Andes.

government has been asked to appropriate 60,000 pesos (about \$21,900) to be used in placing the Argentine section of the road in proper condition for travel.

Freight Rates and Passenger Schedule.

Those back of the enterprise maintain they will be able to transport freight for from \$3 to \$4 a ton, while the present charges on the railroad are from \$6 to \$20. Negotiations already have been under way looking toward a reduction of from 15 to 20 per cent. on the railroad, after it takes the freight, and officials of the Buenos Aires & Pacific Company have taken this phase of the matter up with the governments, suggesting that the Chilean portion of the road bear 40 per cent. of the reduction, and the Argentine portion, 60 per cent.

It is 48 miles from Los Andes to La Cumbre and 100 miles from La Cumbre to Mendoza. It is anticipated that, when the Argentine portion of the route is placed in condition, it will be possible to make the journey with passengers in about five hours, so that travellers from Valparaiso or Santiago would reach Los Andes by train in time to take the automobiles at 1 in the afternoon and would arrive in Mendoza by 6, giving them two hours for luncheon and rest before taking the train for Buenos Aires at 8.

Articles of Transport.

The principal articles of transport for which a profitable business is anticipated would be wood elaborated in the country, barrels in sections, hogshead staves, sulphur, cement, galvanized iron, conserved fruits, etc. Because of the climatic conditions, service necessarily would be confined to the summer months, between October and March or April. (In this connection it is necessary to remember that the seasons in this portion of South America are directly opposite to those in North America.)

Garages are to be installed along the line, these to be fitted with spare motors and all parts and supplies

likely to be needed. It is stated that the plan has received hearty indorsement by influential members of the Argentine congress, and it is expected that it also will receive the sanction of the Chilean body.

SAVE HALF THE COST.

While the conditions under which business is conducted differ materially abroad from those applying in this country, it will prove of interest to note that Sainsbury's of London, one of the best known provision houses in that city, finds the cost of using motor vehicles about 50 per cent. less than that of horses, while the machines are able to cover three times the ground. This statement was made by General Manager Cowell in a recent interview with a representative of the Commercial Motor, a magazine published in England.

The concern began using two five-ton steam trucks nine years ago. These were sold later, not because they were not economical, but because it was found that gasoline machines were somewhat more speedy and it was not deemed advisable to operate a mixed fleet. The present equipment comprises two 28-horsepower 3.5-ton, four 35-horsepower four-ton and one 35-horsepower five-ton Milnes-Daimlers, and a Napier light delivery wagon, the last named being used exclusively for urgent delivery of light goods.

Mr. Cowell feels confident that each of the Milnes-Daimler machines averages 250 miles a week, most of which is covered in London, the only trip into the country being to Watford, about 20 miles distant. The average weekly load is between 250 and 270 tons. The gasoline consumption has figured out at about seven miles to the gallon, although one or two of the vehicles are able to get eight. Of late some experiment has been made with benzol, and an order has been given for sufficient of this fuel to run the whole fleet.



One of the Better Sections of the Mule Trail on the Chilean Side of the Pass, Near Los Andes.

It is added that none of the horses has been sold, the motor vehicles having been added to take care of the growth of the business.

FRENCH TRACTORS WINNERS.

The French minister of war has made public the official announcement respecting the winners in the two classes of tractors competing in the military tests of last March, details of which were published in these columns at the time. In the heavy tractor division, first place was given to the Renault, second to the Latil, third to the Panhard and fourth to the Schneider. In the light division, the Latil took first prize and the second and third went to Chatillon-Panhard machines.

In this connection, it is proper to state that the annual reliability trials for motor trucks entered for subsidy will take place June 29-Aug. 12. Among the different makes which will be represented are Renault, Berliet, La Buire, Rochet-Schneider, De Dion-Bouton, Delahaye, Barron et Viale, Dewald, Schneider, Panhard, Cotton Desgouttes, Blum-Latil, Clement-Bayard, Peugeot, Saurer, Charron, Mors and Balachowsky et Caire.

A SPECIAL BODY DESIGN.

Edurin Perciva dos Santos of Lisbon, Portugal, recently took delivery of a very interesting specially designed Albion motor truck, made in Scotland. The chassis does not depart greatly from the standard Albion product, except that wood artillery wheels are employed instead of steel, this change having been made because of the high duty on steel.

The body, however, is decidedly unusual. This is intended for long distance travelling by road, and affords every convenience for the occupants. The entrance to the interior is at the front, part of the driver's seat being arranged so as to fold up. The inside dimensions are 13 feet six inches length, seven feet six inches width and seven feet six inches high to the underside of the domed roof, which is fitted with four glazed ventilating louvers.

On either side of the apartment are French windows fitted externally, for coolness and privacy, with Venetian fold-back shutters. At the rear are two spring mattress marine berths, one above the other, and on the side is a comfortable couch, which may be used as a bed. On the same side, near the door, is a rosewood wardrobe, and on the opposite side is a washing and toilet set, a table, pressure water tank, another wardrobe and an oil stove.

MAIS ENTERS SIAM.

It is singularly appropriate that His Majesty, King Vajiraudh of Siam, should have selected a Mais truck, made by the Mais Motor Truck Company, Indianapolis, Ind., since a little study will reveal the fact that Siam spelled backward becomes Mais. This coincidence was noted by the King, who told the American selling agent who completed the transaction that in

the future the Mais should be known as the Royal Truck of Siam.

As a matter of strict fact, however, this play upon letters had nothing whatever to do with the sale of the two machines recently purchased by King Vajiraudh. Some time since, in conversation with an American selling agent, His Majesty mentioned that he seriously considered the purchase of a motor truck for use on his vast estate, but was somewhat skeptical because of the hilly condition of the country and the poor roads of the district. The American had an old schoolmate friend connected with the Mais company, who had sent him catalogues from time to time. One of these was dispatched to the King, who reads and speaks English fluently, and he became so thoroughly convinced that this make of truck would do the work he had for it, that he purchased two, one of two tons capacity and the other of three.

FOREIGN NEWS NOTES.

Gasoline-Electric Road Train—Some time since space was devoted in these columns to the installation of 30 electric trucks in the service of the Austrian postoffice department. This government is continually extending its motor postal lines, the railway system in that country being far from sufficient for the needs of the traffic in many sections. The most recent addition is a gasoline-electric road train, consisting of a tractor and five trailers, which is in use for mail, passenger and freight service in some of the more remote regions.

Electric Dumping Wagon—Edison Accumulators, Ltd., of London, England, is taking advantage of every opportunity to interest British business men in electric vehicles. Recently it began demonstrating a dumping wagon, fitted to a standard two-ton chassis. This body is made to run, by means of rollers, on steel runners, so designed that when it is pushed backward a tilting motion is also given. The mechanism is operated by a small electric motor, working through a reduction and gear of suitable type.

White 'Buses in Uruguay—Three White omnibuses, made by the White Company, Cleveland, O., have been in service with the Albatros Autobus Company, plying between Montevideo and Pando, Uruguay, for the past year. The company operates a garage in either city and makes four round trips daily. The roads are surfaced with asphalt, stone block and macadam. During the year the three machines have covered nearly 130,000 miles.

State Lines in Saxony—The government of Saxony, in Germany, has included in its new budget an appropriation of practically \$450,000 for the creation of 19 new state motor 'bus lines, and the taking over of two private lines.

CADILLAC UTILITY CHASSIS.

The Cadillac Motor Car Company, Detroit, Mich., is now building a chassis with a 134-inch wheelbase which is designed for use as a general utility vehicle, being adaptable for equipment with bodies for use as police patrols, hospital ambulances, undertakers' wagons, fire department apparatus, hotel 'buses, as well as for light delivery.

When used for hotel and livery service the chassis is equipped with open or enclosed bodies having capacity for 10 passengers, and fully closed or screen side bodies are installed when used for delivery. The other types of bodies are of conventional design and are specially built for this concern.

BAKER TALKS TO MOTORISTS.

Day Baker, district manager of the New England division of the General Vehicle Company, who is treasurer of the Electric Vehicle Association of America, president of the Electric Motor Car Club of Boston, and treasurer of the Boston Commercial Motor Vehicle Association, was the speaker at the annual dinner of the Milford Automobile Club, the largest organization of the kind in New Hampshire, May 1. His subject was "The Automobile as a Serious Business Proposition".

The Britton-Stevens Motor Corporation has been organized at East Cambridge, Mass., to build a motor truck that will be known as the Bay State. The purpose is to build the machines to meet the demands of a market that will be practically confined to New England. W. C. Guilder, formerly manager of the plant of the Mack Bros. Motor Car Company, Allentown, Penn., is vice president and general manager of the company.

A building has been leased at Detroit, Mich., by the Harrison Manufacturing Company of Lockport, N. Y., maker of automobile radiators, which will be equipped and operated as a branch factory, under the management of Gould Allen, who has been in charge of the Detroit office of the concern. The increase of the company's business necessitated this expansion.

A one-story building, 209 by 80 feet, constructed of brick and steel, is to be erected for the Peters Machine & Manufacturing Company, Cleveland, O., which will be used for general purposes. This company produces front and rear axles, steering gears and gearsets.

The Uhrlandt Gas Generator Company, Columbus, O., has become the Ohio Gas Generator Company, and under that name will continue the production of kerosene gas generators for motor vehicle equipment.

PLAN OWNERS' SUPERVISION.

Motor Truck Club Members to Observe the Operation of Drivers' Work.

The Motor Truck Club of America, which has very carefully systematized its activities with a view of improving results from the use of motor freight carrying vehicles, has devised a plan for the mutual supervision of the drivers of machines owned by club members, which has already become operative. While the intention is to protect each other, the supervision will extend beyond the membership and will only be limited by the observance of the members.

The details of the plan have been practically determined, but it is probable that these will be further systematized as time develops need, and as the resources of the club are concentrated. Each member of the club is expected to observe any instance of negligence, incompetency or unreasonable use of a machine and to make report of the happening to the club secretary by means of printed postal cards supplied by the club.

Aside from the secretary no one will know the source of the information. On receipt of the cards the secretary will have written communication with the owner, directing attention to the specific instance, and in this manner informing him of facts that he can be guided by. It is also a purpose to notify vehicle manufacturers of instances of overloading and of use of machines without sufficient tire equipment, because in cases of this kind the guarantees are extremely important to the owners and ought not to be sacrificed through fault of the drivers, and at the same time protection is due to both the tire and the truck manufacturer. The facts thus far developed by the system have been found to be very useful. The drivers, however, are hardly expected to indorse the supervision.

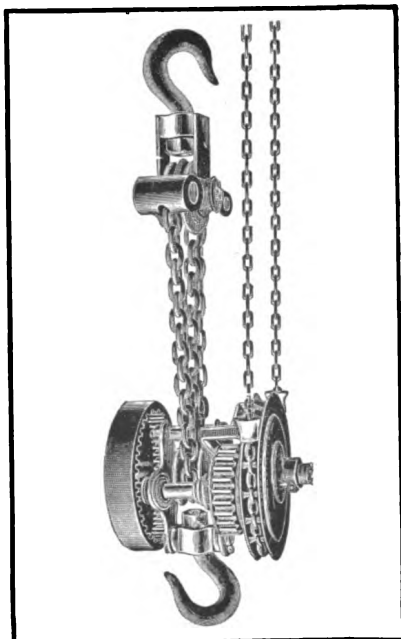
The technical committee of the club has prepared a correspondence course of five lessons, which are intended to better the knowledge of the drivers in a practical way, and this is open to drivers employed by members at a price that is nominal. The committee has given this subject a great deal of attention and the belief is that the drivers can profit materially through the study of the course. The club has inaugurated a campaign to standardize shop practise and repair charges with a view of protecting the members against overcharge and to insure uniformity of the work done, so far as this is practical.

The St. Louis, Mo., branch of the General Motors Truck Company is now managed by C. M. Pachman, formerly manager of the Kansas City, Mo., branch of the Kelly-Springfield Motor Truck Company.

E. R. Fried, who was in charge of research work for the General Motors Company, Detroit, Mich., has become a member of the engineering staff of the Ferro Machine & Foundry Company, Cleveland, O.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE size and weight of components of the commercial vehicle chassis makes handling difficult when the shop is not equipped with suitable means. The



Simplex Chain Hoist.

old method of utilizing several workmen to remove heavy parts from the chassis is not only a loss of time, but of money, and this is especially true when a hurry job is required. In large service stations the equipment not only includes some form of hoist, but generally it is in the form of a traveling hoist, enabling a motor, for example, to be lifted from the frame and transported to the machine shop. But one workman is required.

J. G. Speidel, Reading, Penn., is manufacturing the Simplex chain hoist, one of the qualities of which is that it is a two-speed device, a construction economizing in time where the load to be lifted is of varying weight. As will be noted by an accompanying illustration, an endless chain runs over a chain wheel, which, in connection with a pinion and a brake wheel with ratchet teeth in the outer rim, forms the automatic brake, which prevents the load from descending. These three parts, when assembled, make practically a unit construction, and turn loosely on the reduction extension of the main shaft.

The pinion attached to the hand chain wheel drives a spur gear, which is keyed to a second shaft, at the end of which is another pinion. The last named member engages with an internal spur gear, which is keyed to the opposite end of the main shaft, to which is attached the lift chain wheel. Motion is transmitted from the hand chain to the lift chain, and by pulling on the hand chain, in either direction, the load is lifted or lowered. When hoisting a load the brake wheel, with its ratchet teeth on the outer rim, rotates freely with the hand chain wheel and pinion, and without resistance, as the ratchet pawl runs freely over the teeth. When the pull on the chain wheel ceases, the pawl engages with the teeth of the ratchet on the brake wheel, preventing it from running backward, and so keeping the load suspended.

In lowering the load the hand chain is pulled in an opposite direction, and but little effort is required to overcome the friction of the automatic brake, thus permitting the load to descend and holding the same suspended again, as soon as the workman stops pulling on the hand chain. The load can be lowered at a good rate of speed by a continuous pull upon the hand chain.

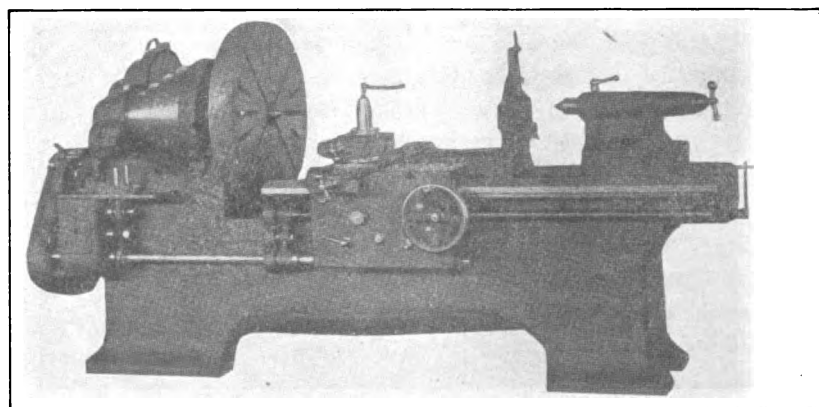
By means of an ingenious arrangement of the lower block, the lift chain is locked to the chain wheel of the lower block, providing the two speeds referred to, making for economy of time in handling light loads. Closed rings attached to a swinging frame provide guides for the hand chain, enabling the operator to stand away from under a load, pulling the chain at an angle, without producing any appreciable amount of friction or wear on the chain or guide. The construction eliminates the possibility of the chain wedging between the wheels and guides. Price lists will be supplied upon request.

NEW BARNES LATHE.

The Barnes Drill Company, Rockford, Ill., is marketing a new 22 to 36-inch sliding extension gap lathe, having a bed of 102 inches long, and adapted to a general class of work in a shop where the demands are of large range.

The lathe will take work between centres, with the gap closed, 50 inches in length, while the gap has a maximum opening of 36 inches. The top bed, which is 24.875 inches wide, extends beyond the main bed to provide a firm support for the carriage when turning large diameter work in the gap. This is held to eliminate the necessity of an auxiliary brace.

The lathe has a cone pulley drive, with a four-step pulley. There are 12 spindle speeds, ranging from 2.3 to 400 revolutions a minute, with a countershaft speed



Barnes New 22 to 36-inch Sliding Extension Gap Lathe.

of 200 revolutions a minute. There are six geared feeds ranging from .008 to .123 inches a revolution of the spindle. Any number of threads ranging from

two to 20 can be cut. Two sets of back gears, having ratios of 8:1 and 44:1, respectively, are provided. The net weight of the machine is approximately 5300 pounds. Complete details and price will be supplied upon request.

THE CALCULAGRAPH.

An accurate, practical time keeping system is an advantage to any repair shop or service station, as it not only keeps a correct record of intermittent work on the same job, but enables the proprietor to itemize easily the labor, etc. Many times a workman starts on a job and is taken off to do work on another machine, and under such conditions it is difficult to keep an accurate record of the time on each unless a time recording system is utilized.

The Calculagraph Company, 13 Maiden lane, New York City, is manufacturing an instrument termed the Calculagraph, which is held to maintain an accurate record of the time spent by the workman on a job, and one of the qualities of the instrument is that it prints the elapsed time in hours or minutes or fractions thereof. The system is very easily operated.



Calculagraph, a Time Record Clock.

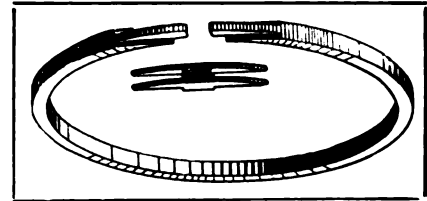
The clock is shown in an accompanying illustration and stamps on a card the time the work is started, completed and the lapsed time. The clock is easily utilized. All the workman has to do is to take a card, insert it in the machine and pull the stamping lever. When the job is completed, or should he be called off to work on another machine, he places the card in the clock, operates the lever and the time consumed is automatically recorded.

The advantages claimed for the Calculagraph are: Saves time wasted when the workman makes out his time slips for the day; simplifies bookkeeping, as the actual time is recorded, and insures accuracy. The Calculagraph has three dials. That at the right shows the time the work is commenced and the other two the time employed, the left indicating the hours and the centre the tenths. The compactness of the clock is indicated in the accompanying illustration.

When the card is inserted in the clock the handle is moved in one direction and this stamps the starting time, also the figures of the other two dials. When the job is completed the handle is moved the other way and this stamps two arrows, indicating hours and tenths on the card. A date printing attachment is supplied if desired. Complete details of the system and prices will be supplied upon request.

BURD PISTON RING.

The Burd piston ring is manufactured by R. L. Burd, 818 South Main street, Rockford, Ill. It is a split construction and the ends are joined together by a coupler, which is shown detached in the accompanying illustration. One of the qualities of the design emphasized is its easy fitting and removal.



Burd Compression Piston Ring.

After the ring is sprung over the piston, the bronze coupler is inserted. It is stated that the two lock together as the cylinder is slipped over the construction.

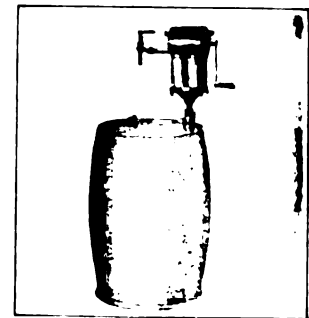
It is claimed that the Burd ring provides an equal pressure on the cylinder walls, and that the coupler seals the opening effectually, preventing the passage of oil or the mixture. The maker states that the rings have been subjected to severe tests in service and that they will considerably improve the compression of any motor, particularly old engines. The Burd rings come in standard sizes up to six inches.

GROETKEN PUMP.

A pump of the self-measuring type and one that can be employed with barrels as well as with underground systems, is the Groetken, manufactured by the J. J. Groetken Pump Company, Aurora, Ill. It is designed to make for convenient and economical handling of gasoline, kerosene, oils and other fluids, and, as will be noted by an accompanying illustration, is very compact. The construction is simple and accuracy in measuring is emphasized in the design.

The pump proper consists of two seamless brass cylinders, to which are attached an iron cap and base. The cap is made in two sections, with the lower member chambered to permit the use of a fibre gasket, into which the ends of the cylinder are seated, making a tight construction.

The base is machined and chambered where joined to the cylinders to provide an absolutely tight joint. The assembly is rigidly retained by four .3125-inch bolts, and the lid of the cap is clamped to the cap with .25-inch cap screws. It is stated that the gland stuffing box used in this pump prevents leakage around the crankshaft, also acts as an air chamber, facilitating the flow of the liquid.



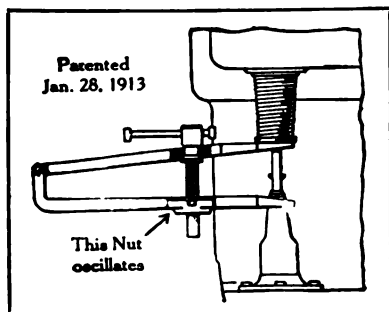
Groetken Pump.

The pump head is 15 inches overall, and all pumps have one-inch standard pipe intake and .75-inch outlet. All parts are machined carefully and each pump is tested after assem-

bly. Prices and complete details will be forwarded upon request.

C. P. IMPROVED VALVE LIFTER.

The Clinton Machine Works, 460 High street, Clinton, Mass., is marketing the C. P. improved valve



C. P. Improved Valve Lifter.

lifter, which is shown in the accompanying illustration compressing a valve spring on a motor. The tool operates in a manner similar to a vise, a threaded member being actuated by a lever or handle. By placing the forks of the lifter on the push-

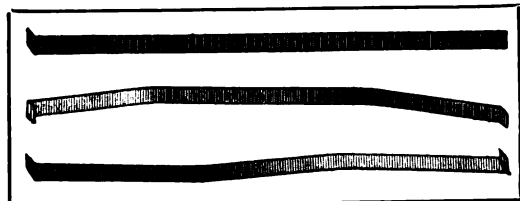
rod and valve spring, the screw of the threaded member moves the upper fork upward, compressing the spring. The lower fork carries an oscillating nut, compensating for the movement of the upper fork. As is obvious from the illustration the spring is locked, enabling the workman to use both hands to remove the retaining key or pin, an advantage where these members are burred and require force. The design also eliminates the possibility of the tool slipping and injuring the hands. The C. P. improved valve lifter is adaptable to any type and make of motor.

SLOCOMB MICROMETER.

The J. T. Slocumb Company, 29 Oxford street, Providence, R. I., is manufacturing the Slocumb micrometer, which is constructed to withstand severe service without affecting its accuracy. It is made in all styles and sizes and comes with inch or metric measurements.

MORGAN SCRAPERS.

Carbon scrapers are essential tools in the shop equipment and while these can be made, time and money can be saved by purchasing them ready made when they are not expensive. The Morgan Manufacturing Company, Newport, R. I., is marketing the Morgan scrapers shown in an accompanying illustration,



Morgan Flexible Carbon Scrapers.

The tools are constructed of a high grade steel; are flexible, and two have their ends bent to right angles and sharpened for removing deposits from the top of the cylin-

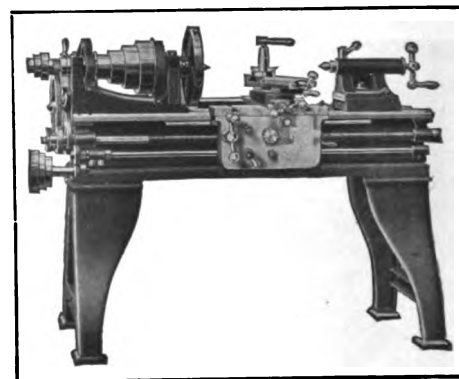
ders or pistons. The third tool is straight, but both ends are sharpened for scraping around valves, etc.

KRAKNO.

The R. F. Johnston Paint Company, Cincinnati, O., is marketing Krakno, a filler or surfacer for use on wood, metal or canvas. It is utilized when painting truck bodies, and as a surfacer over cracked paint or varnish. The company issues a complete booklet on the subject of painting cars and will supply the brochure free on request.

SEBASTIAN LATHE.

The Sebastian Lathe Company, 125 Culvert street, Cincinnati, O., maker of high grade lathes for manufacturing, jobbing or the repair shop, is issuing its new catalogue, which is finely illustrated and contains complete descriptions of its product. The lathes built by this concern are from entirely new patterns and designs, and are modern and practical in every particular. Special care is given in their construction, and the best of workmanship and high grade material are incorporated. A postal addressed to the company will bring the catalogue referred to, in which full particulars, including dimensions, prices, etc., are given.



Sebastian Lathe.

BRAUNSDORF FELT PACKINGS.

George W. Braunsdorf, 236 East 43rd street, New York City, is manufacturing a line of felt packings for automobiles, consisting of dust rings for hubs, strips for crankcases, and washers for all lubricating and dust excluding purposes. The concern also produces fibre washers in any size and quantity.

ALUMIFIX.

Alumifix, an alloy of six metals with a co-efficient of expansion under heat practically the same as aluminum, is being marketed by the Chemical Specialties Company, Kansas City, Mo. It is used for soldering aluminum.

With capital of \$100,000 the Chapleau Wagon & Auto Company has been organized at Montreal, P. Q., by Joseph A. Dufresne and Frederick H. Chapleau, to manufacture motor cars, trucks, etc.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXII---Construction and Operation of Connecticut Magneto, Which Differs from Conventional Design in That the Transformer Coil Is Incased in a Metal Tube Threaded into the Instrument Itself.

By C. P. Shattuck.

IN THE previous installments dealing with the construction and operation of magnetos two general types have been discussed. These included the true

high-tension, in which the armature carries two windings, a primary and a secondary, and with which a step-up coil is not necessary. The other design is the low-tension instrument, which requires a coil to transform the low-tension current into a high-tension.

All of the latter types which have been discussed utilize a separate coil; that is, the unit is

mounted on the dash. It will be recalled that the wiring diagrams indicate several leads from the magneto to the coil, these including two or three primary connections and generally one secondary.



Fig. 140—Connecticut Dash Type Switch.

With these systems the low-tension current generated by the magneto is conveyed to the coil, where it is transformed into a high, then passes to the distributor of the instrument. This construction applies to the average low-tension magneto system of ignition.

How Connecticut Differs.

The Connecticut Telephone & Electric Company, Inc., Meriden, Conn., well known in the electrical industry, has been marketing for some time a high grade magneto that is standard equipment on commercial and pleasure automobiles. It has successfully withstood the test of continued service, and incorporated in the instrument and its fittings is the same high grade material for which the products of this concern is noted. The workmanship is first class in every respect.

There are a number of interesting features noticeable in the Connecticut magneto, the most striking of which, perhaps, is the method employed in obtaining

or transforming the low-tension current into one having sufficient energy to bridge the spark plug gap at low motor speeds.

Novel Location of Coil.

In the Connecticut design, instead of employing a dash transformer, the coil is located in the instrument itself. The magneto is, of course, of the low-tension type; that is, the armature carries a single winding of primary wire. By referring to Fig. 144 it will be seen that the transformer coil is cylindrical in shape and that its top is provided with a substantial terminal. The transformer proper is enclosed within a metal tube, the upper portion of which is threaded. Above the armature and between the magnets is a cylindrical space into which the coil fits, it being screwed in, and when in position its terminal is connected to a lead as shown by Fig. 143, which depicts the transformer in place.

Advantages of Location.

The advantages of the construction are numerous. In the first place, it eliminates the usual multiple primary wires and connections between the magneto

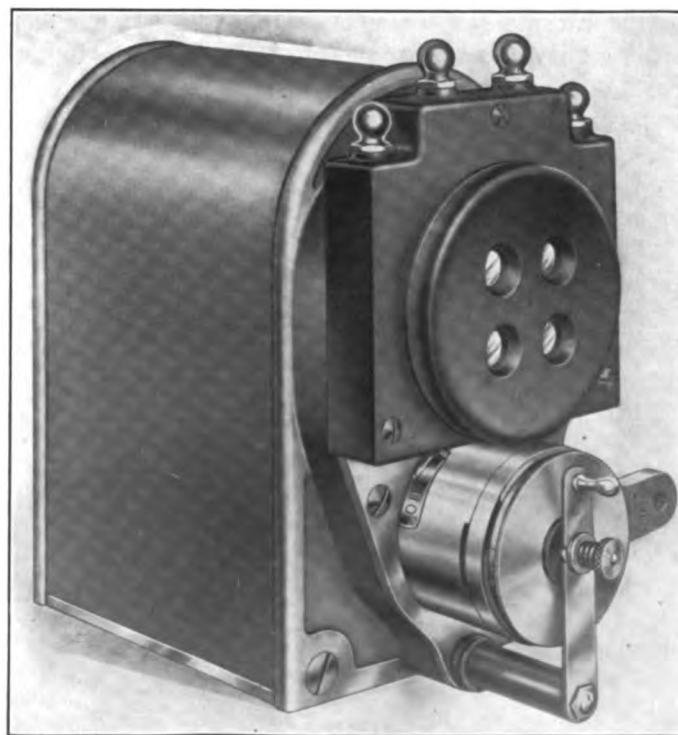


Fig. 141—Connecticut Type A-4 Independent Magneto, Differing from General Practice in That Transformer Coil Is Mounted in the Instrument.

and the dash coil, also a secondary lead, as previously pointed out. Being threaded into the instrument the coil is fully protected against the action of moisture,

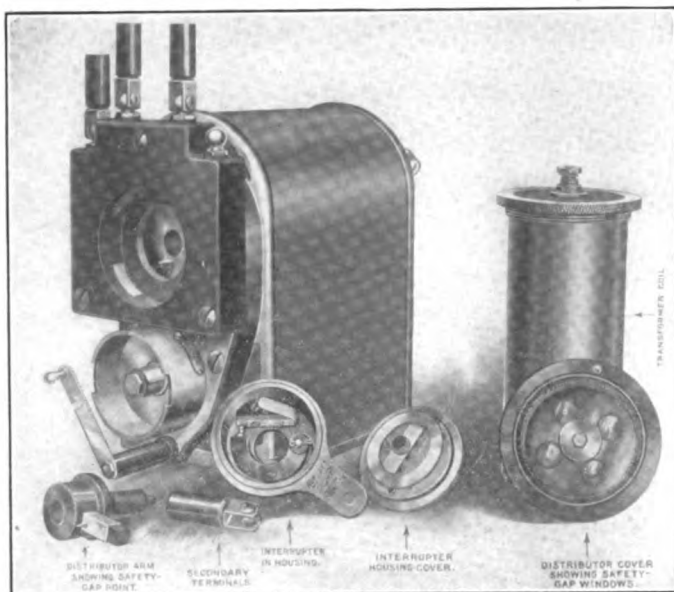


Fig. 142—The Connecticut Independent Type Magneto Partially Disassembled.

and is dust proof. One of the qualities of the design is that the coil can be instantly removed, if necessary, and replaced by another without disturbing a number of connections. As there is but one primary wire leading to the dash type of switch, with the independent type, it is obvious that the wiring plan is very simple.

Single and Dual Types.

The Connecticut magneto is made in two forms, a single or independent, and a dual system. The first, known as the type A-4 and type A-6, for four and six-cylinder motors respectively, is adapted to engines having but one set of spark plugs. It may also be used in conjunction with any battery system, providing for two sets of spark plugs, and while each system is independent of the other, their operation is controlled by the Connecticut combination magneto and battery switch.

The dual system, which is designed for both four and six-cylinder motors, is made in practically two forms. One provides for starting on the switch, which is of the kick type and equipped with a starting button. The other system employs a separate starting vibrator.

Construction of Magneto.

In general construction the Connecticut magneto follows conventional practise, in that the single wound armature revolves between the pole pieces energized by the permanent U shaped magnets forming the field. The base, front and rear frames are of solid brass castings, carefully machined, and every part is interchangeable. The magnets are constructed from the best grade of magnetic steel, are carefully tested, and are held to retain their magnetism indefinitely.

Ball bearings are utilized to support the armature shaft, single members being employed, while double

are used in the distributor. All parts requiring insulation are molded from a special compound having a high resistance to heat, etc. Opportunity for loss of current is reduced to the minimum and the connections between the revolving distributor brush and the secondary terminal of the coil are very simple.

Ease of Assembly.

Noticeable qualities of the design are the simplicity of the parts and their accessibility. The instrument partially disassembled is shown at Fig. 142, with the components lettered. The interrupter cup, which is rendered dust and moisture proof by the usual cover, contains the mechanism utilized for interrupting the primary current, and is displaced by loosening a terminal and sliding the spring lever sideways. With the dual magneto it is necessary to revolve the cup cover while the spring is moved sideways, this being required to allow the end of the spring post to clear the binding posts.

The platinum points utilized are ample in size, and comprise a fixed and a movable member. The movable lever, controlled by a spring, is semi-circular in shape, and it will be noted by reference to Fig. 142 that one end is pivotally mounted while the other carries the platinum point. Fitted to the lever is a hardened and ground steel roller which is actuated by the cam members.

Adjustable Features.

One of the features of the interrupter housing, which is reversible, that is, the advancing and retarding lever may be located on either side of the instru-

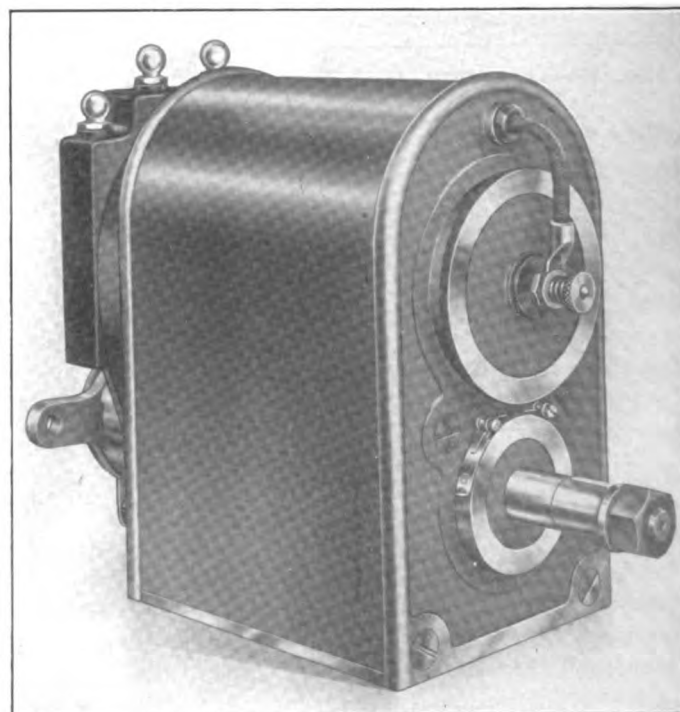


Fig. 143—Rear View of Connecticut Magneto, Illustrating Transformer Coil in Place.

ment, is the incorporation of a slot for cleaning and truing the platinum points when necessary. This work is performed with the interrupter housing cover

displaced from the instrument and held in the hands. Adjustment of the break of the contact points is also made easily by this arrangement. The adjusting nut is located on the fixed member.

Distributor Accessible.

The distribution of the high-tension current to the plugs is accomplished by a carbon brush mounted in the distributor arm shown disassembled at Fig. 142, the brush making contact with the segments in the housing. The distributor cover employed differs from conventional design in that four windows are provided, these being employed to aid in the quick detection of trouble. In the event a spark plug becomes faulty in its action or a loose connection occurs in the secondary circuit, a spark will show in a window, of which there is one for each cable leading to the plugs. This flame is created when the trouble referred to is encountered, as there is a safety gap between the spur of

the distributor arm and the inner side of the distributor cover. It is obvious that the construction is a distinct advantage in locating faulty action of a plug or the secondary cables.

Both types of Connecticut magnetos may be driven in either a clockwise or anti-clockwise direction by substituting an interrupter cup of corresponding rotation, and by changing the screw stud in the distributor gear, which actuates the distributor arm, the stud being inserted in a hole marked R

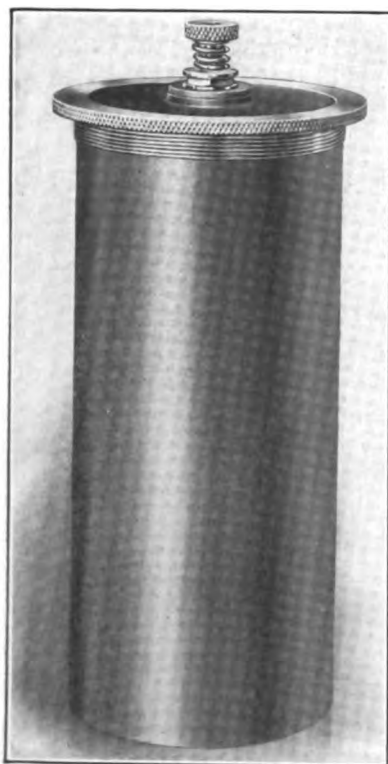


Fig. 144—Transformer Coil Complete, Removed from Magneto.

for a clockwise direction, and in L for anti-clockwise drive. As with all magnetos the direction of rotation of the instrument is determined by looking at the instrument from the driving end.

Wiring Plan.

The wiring plan of the single or independent type of instrument is simple. A primary wire leads from the terminal on the breaker box cover to one pole of a two-pole dash switch. The other pole of the switch is connected to the metal of the chassis, and when the switch is closed the armature is short circuited.

The dual type differs in that the breaker box cover has two terminals, and the current from the magneto and that from a battery can be utilized on the same set of plugs. The same interrupter and distributor of the magneto are utilized for the battery or magneto

systems, and the only change in switching from the battery to magneto being the source of current supply. This follows conventional practise.

A starting vibrator is a part of the system and it is supplied in two forms, one a nicely finished mahogany case with kick switch for mounting on the driver's side of the dash, and the other of the tube type with brackets for mounting under the hood. A rear view of the first named design is shown at Fig. 145

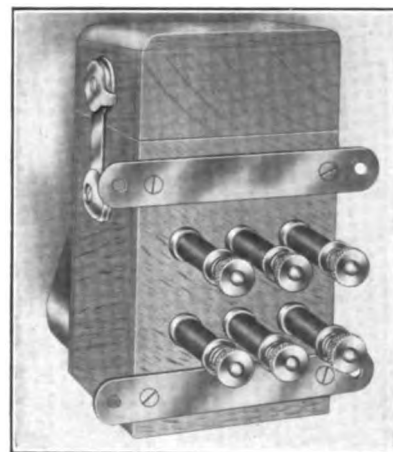


Fig. 145—Rear of Dual Starting Vibrator and Connectors.

All vibrators of the dash type are provided with a removable plug for locking the ignition. The company also manufactures a flush type of dash switch for the tube coil, and it is equipped with the usual starting vibrator button.

Operation of Vibrator.

The starting vibrator is employed for starting on the spark, and when the lever is moved to the battery position, and the button depressed, a steady stream of high-tension sparks occurs at the plug of the cylinder on compression, as the vibrator and the primary of the transformer coil are coupled in series in such manner that the battery circuit is automatically made and broken many times during this compression. A series of impulses is produced in the secondary coil because of the fluctuations in core strength of the primary. As soon as the engine starts and the button is released, single sparks take place, as the battery current is then broken by the magneto interrupter mechanism. Upon moving the switch lever to "Magneto" the battery current is cut out and the source of supply is the mechanical generator. The wiring plan for the dual mag-

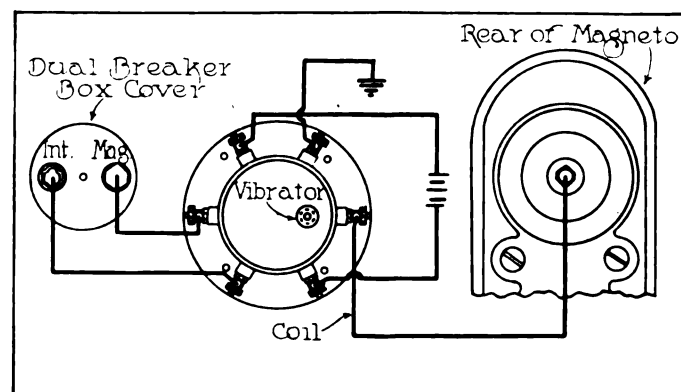
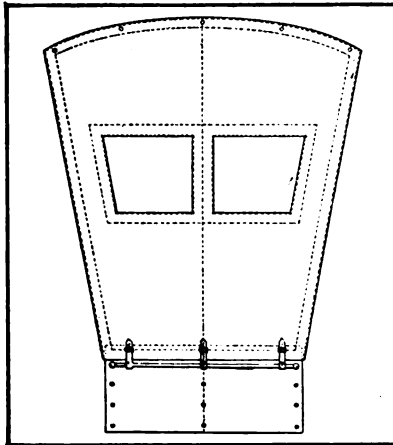


Fig. 146—Wiring Diagram of Connecticut Dual Magneto—Note the Simplicity of Wiring.

neto is shown at Fig. 146 and its simplicity is apparent. Both leads from the battery are connected to the vibrator.

HINTS FOR PROPER MAINTENANCE.

STORM fronts utilized with commercial vehicles are generally made of the same material as the top is trimmed with, and made loose; that is, made to knob all around, so that they can be taken off when not in use.



Storm Curtain for Trucks.

A suggestion for making and fitting a storm front is made in the Carriage Monthly and is as follows: Cut a piece of the goods the size required to fit on the job. First divide the space top curve for five fasteners and mark them with chalk where they are to be placed. Mark the centre on goods and tack temporarily to centre of curve, then drive tacks through goods up to chalk marks for fasteners. Next tack the goods to the dash, driving the tacks through the goods to the dash, spaced equally two inches from the top.

Mark goods and dash where the fasteners should be placed, also on the curtain. Mark where the celluloid window should be, and be careful to have it in the right place. When all is marked, remove the goods and make up the curtains. Cut two inches from tack holes where the fasteners are; at top and bottom mark so that the curtain will be even with outside of dash when finished. Turn a hem and sew on the machine. Put on fasteners, using a brass turn button fastener on top of bow, and buckle and strap on the bottom of the curtain, the buckle and strap allowing more play for the possible sagging of the top. When all this is done the celluloid is put in the curtain and sewed.

The best and quickest way to place the celluloid is first to sew a one by .5-inch piece of goods in the centre of the celluloid and sew around the outside edge; then turn the curtain over and cut out the centre of the goods, allowing enough so as to have .5-inch turn down all around. Sew down on the machine, and the front is ready to place on the machine. The fasteners can be placed on the job, when the tack holes are made, while fitting it.

MAKING A VALVE LIFTER.

A valve lifter that may be made at a slight expense and which may be employed with varying types of motors is shown in an accompanying illustration. As will be noted the hook portion resting on the head of the valve prevents the latter from lifting while the

spring is being compressed, and the slots and the chain make it possible to change the position of the tool to meet the requirements of different motors, as well as to operate the lifter in different positions.

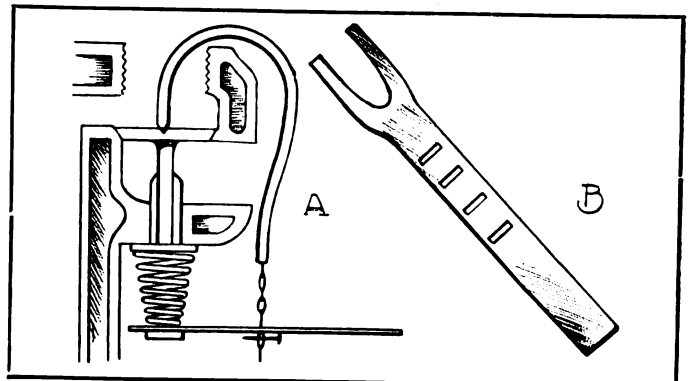
To make the tool, a piece of steel about 15 inches long, .75 wide and .3125 inch thick is necessary. One end is cut in the shape of a fork, as indicated at B in the drawing. Next cut four slots, equidistant. The holes can be made by using a breast or power drill, then breaking out the walls with a cold chisel, after which the apertures can be smoothed up with a flat file.

The fulcrum member shown in position at A can be constructed from an iron rod about 15 inches long and approximately .5 inch in diameter. It is bent to the shape indicated, and the end coming in contact with the valve head is made tooth shaped so that it will fit the slot in the valve head. It could be made pointed if desired, depending upon the type of valve. To the lower end of the hook member is attached a chain.

The method of using this valve lifter is simple. The valve plug is displaced from the cylinder and the hook inserted as shown at A. The lever member B is then employed in the conventional manner, and the chain passed through an opening, one best adapted to obtain the desired leverage. It will be noted that the chain is prevented from leaving the lever by a small pin.

CARE OF VALVE PLUGS.

After grinding in the valves and before replacing the valve caps, smear the threads of the latter with a paste composed of powdered graphite and oil. This will insure easy removal of the caps, as the graphite will remain after the oil has evaporated. If asbestos or similar material is utilized for gaskets on places subjected to considerable heat, the exhaust, for example, coat the gaskets with the graphite preparation. It will prevent sticking and make it possible to use the gasket a second or third time. The threads of spark plugs may be treated in a similar manner.



Home Made Valve Lifter Adapted to Fit Practically Any Type of Motor: A, Showing the Tool in Position; B, the Lever, Having Slots to Obtain Varying Positions.

CORRESPONDENCE WITH THE READER.

Bending Pipe—I. W. K., Rock Island, Ill.

I had occasion to bend some copper pipe for the gasoline feed and wished to make a coil of it. I spoiled several feet of the tubing by putting kinks in it. What is the best way to handle the work?

There are several methods of bending tubing, these including filling the pipe with sand, resin, etc.,

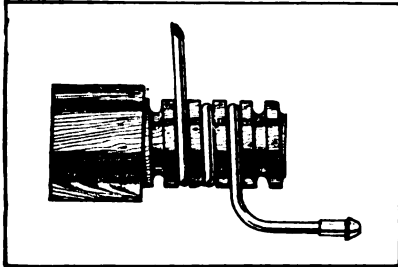


Fig. 1—Jig for Bending Tubing.

or by using a jig. A method of accomplishing the work by the last named method was published in Commercial Motor, an English publication, and the sketch shown at

Fig. 1 was reproduced from the article in question. It will be noted that it is a jig which comprises a piece of hard wood about three inches square and about eight long. One end is turned down to 2.5 inches in diameter and the cut made about five inches from the end. On the smaller portion is cut a deep thread about .3125-inch deep. A round nosed tool of the same radius as the outside of the pipe is best adapted for the work.

To utilize the jig its square end is clamped in the vise. Before attempting to bend the pipe it should be annealed by heating. The section to be bent is filled with resin. Next place the part of the pipe where the bend is desired in the first part of the thread, holding it down with one hand and with the other wind it round the necessary number of turns, finishing with the ends just opposite each other. The pipe is then unscrewed and the resin melted out of it. It is stated that bends can be obtained by this method without kinking and much more rapidly than by the usual means.

Measuring Gears—S. M., New Rochelle, N. Y.

I am fitting a magneto to a pleasure car which will be used for trucking. I plan to drive off the timer shaft, using a plain gear. The motor is a four-cylinder, four-cycle. What gears are best to use; that is, how many teeth should the timer shaft gear have and how many for the magneto? How do you measure the gears to fit the magneto?

When a magneto is driven off the timer or camshaft, the driving gear on this shaft must have twice as many teeth as the magneto gear. For example, if the camshaft incorrectly and if the magneto is driven have 32. This is necessary to drive the armature shaft of the magneto at crankshaft speed, for it should be borne in mind that the camshaft rotates at half crankshaft speed.

The distance between centres, that is, between that of the armature shaft and camshaft, should be considered, and after the base or bracket used for retaining the magneto has been figured. It would be well to use a piece of wood for a pattern for the base and by placing the magneto on it the work of estim-

ating the centres referred to will be accomplished more easily. This should be performed very carefully and the measurements checked up several times.

In measuring for the gears, the pitch diameter is considered, not the outside diameter. By referring to Fig. 2 it will be noted that there is a difference between the pitch and outside diameter of the gear, which in this instance is a spur gear of the involute form. The drawing shows the measurements to be considered if this type of gear is to be employed. Gears of this kind are generally carried in stock by a number of concerns and are not expensive.

The diameter of the hole should be given careful consideration, and if that of the shafts does not correspond with the stock gears, it will be necessary to have bushings made or purchase blanks and have the latter cut. Much depends upon the pitch diameter required, the diameter of the driving shaft, and that of the armature shaft. If the magneto is a new one the maker will supply a booklet or circular giving the dimensions of the instrument.

Motor Heats—Reader, Newburg, N. Y.

We overhauled the motor of our delivery car and find that it is not only hard to start, but heats considerably. The carburetor setting was not changed, and we have examined the water cooling system and it is in perfect shape. The motor appears dead and does not pick up the way it used to even with the spark fully advanced. What is your opinion as to the cause of trouble?

Assuming that the mixture is correct and that the components of the cooling system are functioning properly, the trouble referred to indicates that the timing is not correct. This may be due to replacing the camshaft incorrectly and if the magneto is driven off the camshaft, its timing would be affected. Check

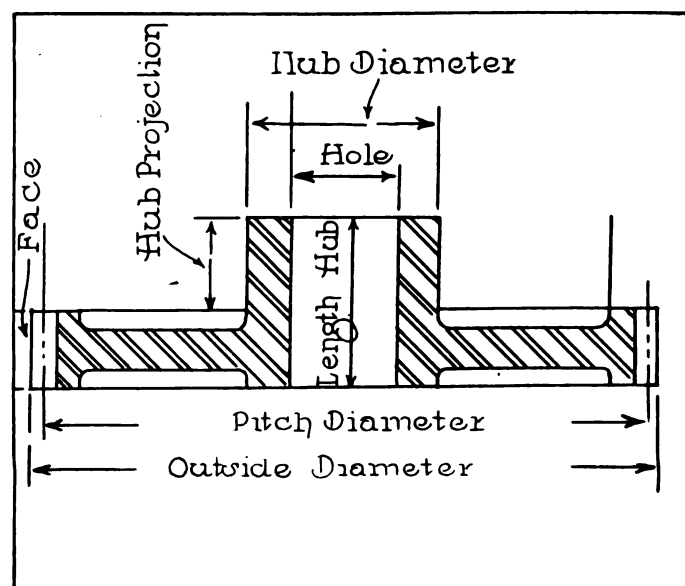


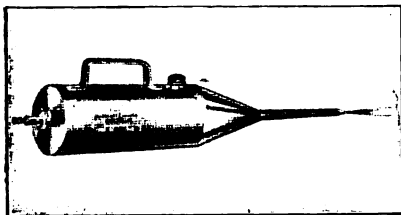
Fig. 2—Measurements to Be Considered in Utilizing Spur Gears of Involute Form.

up the valve timing, also that of the ignition system. Too late a spark would be productive of the trouble mentioned, especially that of hard starting.

NEW COMMERCIAL CAR ACCESSORIES.

Romort Engine Cleaner.

The Romort Valve Company, 701 East Pike street, Seattle, Wash., is manufacturing the Romort engine cleaner, which



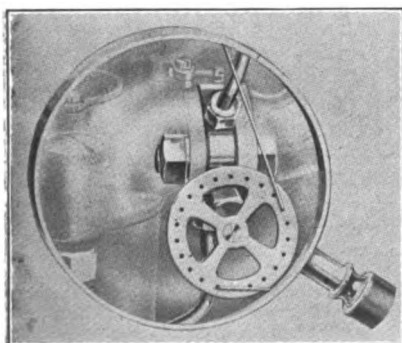
is designed especially for removing oil, grease and dirt from the motor and components of the chassis. The Romort is filled with two quarts of kerosene or gasoline, and air is supplied by a pump, compressor or tire power pump, a standard connection being provided. Turning a knurled rod opens a valve, permitting the fluid to be forced out in a very strong spray, which may be regulated as desired by the operator. The cleaner is equipped with a long spout, making it an easy task to reach parts not accessible by the usual cleaning methods. Being forced at a high pressure the spray removes deposits that would ordinarily require considerable labor to displace by the brush or rag treatment. The Romort engine cleaner is moderately priced.

Alderman Power Magnifier.

The Alderman primer and power magnifier is produced by the Alderman Manufacturing Company, Rochester, N. Y., and, as the name implies, combines a priming and mixing device. The primer is constructed to be operated either from the seat or in front of the car and includes, in addition to the actuating means, a tube placed inside of the intake manifold. The fuel is led to this tube by a special connection, and when the piston descends on the suction stroke, the gasoline is sprayed, forming a rich mixture. Condensation is held to be eliminated. It is stated that the device can be fitted without drilling or any alteration.

The magnifier mixes superheated air in the proper proportion with the vapor from the carburetor, the heat of the exhaust being utilized and being carried through a special tube to the power magnifier. The control unit is mounted on the dash and is provided with a lever, enabling the driver to cut down or increase the air supply according to conditions. When a motor starter is utilized a press button is included.

The fitting of the combined primer and power magnifier does not require any alterations, other than incorporating a union in the fuel line, and this member, as well as all necessary bolts, gaskets, screws, etc., is supplied with

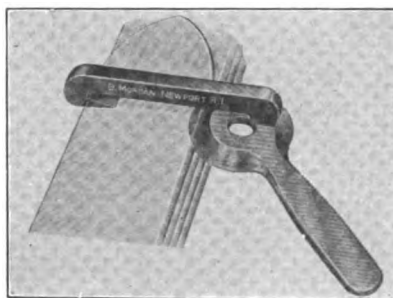


each outfit. The company is making a special design for Ford cars.

Morgan Spring Opener.

The Morgan Manufacturing Company, Newport, R. I., maker of tools, accessories, etc., for the motor car and repair shop, is marketing the Morgan rolling spring leaf opener, a simple and practical design in that it requires no adjustment. It is constructed especially for separating the leaves of a spring, permitting of cleaning and lubricating the bearing surfaces without jacking up the car.

As will be noted by the accompanying illustration, the device comes in two parts, one of which is provided with a chisel point. This is inserted between the leaves of the spring near the end and the edge of the rolling tool on the other side. Previous to this work the small bolts are removed from the spring clip. By rolling toward the centre of

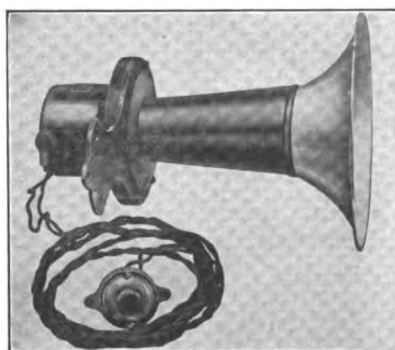


the spring or towards the axle, the leaves will be separated easily and readily.

One of the qualities of the device is that it is manufactured in various sizes, these ranging from that adapted to a cyclecar to that for a truck.

Apollo Electric Horn.

The Automobile Supply Manufacturing Company, Brooklyn, N. Y., is marketing a new design of electric horn termed the Apollo. It is a moderately priced signal, but the maker states that the same material and workmanship are



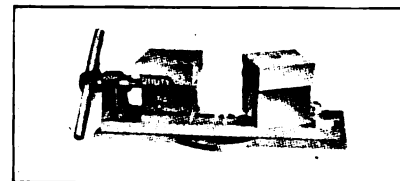
incorporated as in the other products of the company. The tone is claimed to be far reaching, but free from harshness. The warning note is held to be specially adapted for city work.

The operating mechanism is stated to be so constructed that it will require no attention, and the horn is accompanied by a three years' guarantee. It comes in two sizes, the model S having a five-inch bell and overall length of nine inches. Model L is 10 inches long and has a 7.25-inch bell. It comes complete with push button, cord, etc., and is held to be economical in current consumption.

In writing for prices, etc., always mention the MOTOR TRUCK. Particular attention is called to the Classified Buyers' Guide, found elsewhere.

Jackson Utility Vise.

The Utility vise is manufactured by C. J. Jackson, M. E., Easton, Penn., and one of its qualities is its adaptability



for holding a variety of material in a number of different positions without the aid of clamps, bolts, etc.

Operation of the front jaw of the vise is by a steel screw and a bronze nut. The four-faced revolving rear jaw is in the form of a hollow cube, having one side left open to permit of using a wrench for actuating the locking screw nut. This construction permits of utilizing the jaws singly or in combination.

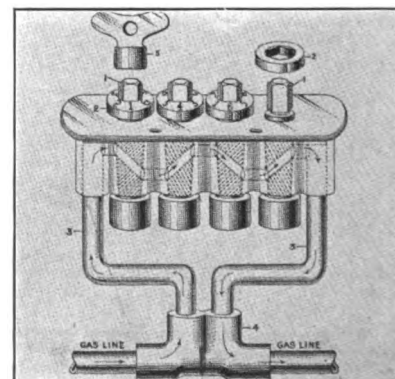
A type smaller than the standard size is manufactured, and is especially suited for the driver who undertakes his own repairs. One of the features of the design is the rapidity with which the work may be clamped into position and removed. The Utility vise is moderately priced.

Security Auto Lock.

One of the most practical and efficient methods of preventing use of the car by others than those intended is to lock the fuel supply. When the flow of fuel is cut off, the amount remaining in the carburetor will be sufficient to operate the machine but a very short distance, and even this can be prevented by running the motor a little while after the fuel is locked.

The Security Auto Lock Company, 1733 Broadway, New York City, is making the Security auto lock, which is an ingenious device for incorporation in the fuel line, convenient to the operator. It comprises four valve members in a row, each having a passage for the gasoline. The fuel enters and flows as indicated by the arrows in the illustration, but it can pass only when the valve mechanism is set in a certain position. The failure of one of the valves, of course, locks the device, cutting off the fuel supply.

At the top of each valve is a numbered ring, and the passages are made to register by turning the plug members with a small wrench key until those forming the combination are properly set. One of the qualities of the invention is that the numbered rings can be removed and replaced, providing an endless number of combinations known only to the person or persons who are authorized to utilize the machine.



ELECTRIC INTERESTS IN CONVENTION.

Second Annual New England Gathering of Central Station and Vehicle Manufacturers' Representatives at Boston an Enthusiastic and Thoroughly Promotive Event.

THE second annual convention of the central stations, electric vehicle manufacturers and allied interests of New England, which took place at Boston, May 19-20, was in every sense successful and productive of substantial results. The convention was organized by the New England section, Electric Vehicle Association of America, and took place at the Engineers' Club, Arlington street and Commonwealth avenue, and at the service station of the Edison Electric Illuminating Company of Boston, and was concluded by an outing and dinner at the Relay house at Nahant. In a number of respects the convention followed the lines of the assembly of a year ago, but it was in a large measure more confined to New England and New England interests. The interest was

been accomplished, and indicated the possibilities were every interest seeking the general promotion of the use of the electric pleasure car and wagon or truck.

He dealt with the co-operation of the central stations with the manufacturer of vehicles and batteries, with the selling representatives of such concerns, and with the owners of machines, specifying the need of the closest relations and pointing out that the future was to be considered more than the present, and that by thorough understanding of the attitude of all interests entire satisfaction would result. The main purpose was to stimulate the use of the electric vehicle, which had been proven to be practical, reliable and enduring, and what was needed was the confidence of the public in the assurances of the different interests,



Group of the Delegates to the Second Annual New England Convention of Central Stations, Electric Vehicle Manufacturers and Allied Interests, Held at the Engineers' Club, Boston, Mass., May 18-20.

keen and the attendance was very satisfactory. The papers presented dealt with a diversity of subjects and the discussions that followed were unusually productive.

The morning of the first day was given over to registration and to the reception of delegates by the officers and committees of the organization, and the first session was begun at 1 in the afternoon, it being presided over by Day Baker, president of the Electric Motor Car Club of Boston, in the absence of Chairman J. A. Hunnewell.

Defines Co-Operation.

The first paper of the session was by William H. Blood, Jr., who was first president of the Electric Vehicle Association, whose subject was "Co-Operation". Mr. Blood's paper defined co-operation as applied to the work of the Electric Vehicle Association. In this he traced the growth of the association, its scope and its activities, and outlined the purposes of those who were instrumental in its organization. He took up the need of the unification of all the interests represented in the association and pointed out what had

which could only be created by all being in accord, and each relying upon the other to follow a policy that would mean first of all promotion and later on productiveness, in which each could share to the fullest degree.

The co-operation of the central stations with the vehicle manufacturers would mean that those who desired to use machines could obtain current at prices that would not be regarded as exorbitant, that advice and assistance would be always available, that service would be given on a basis that would attract and not be regarded as indifference. The co-operation of the vehicle manufacturers with the central stations should be of that character that would stimulate the public service companies to constantly promote the use of machines, so that their representatives could deal with the public with absolute certainty as to conditions and relations, and these should meet each other at parity so far as willingness to further the general promotion and the general satisfaction and convenience of the public are concerned.

"The Electric Vehicle Association of America" was

the title of the address made by A. Jackson Marshall, executive secretary of the association, who to considerable length described the growth of the organization during the past year, this being the result of a campaign to obtain a membership of 1000 before the fifth annual convention at Philadelphia in October. He instanced the formation of new sections at Philadelphia, Washington and Cincinnati, with organizations pending in San Francisco, Los Angeles, Cleveland and Detroit, and stated the hope of the officers to have 15 sections organized by the opening of the convention. There was also probability of the organization of sections abroad, which would make the association international in character and scope, and which would mean that its endeavors would be the world over. A great deal of the time of the officers has been devoted thus far the present year to the development of a membership that would consist of energetic and resourceful men, who would be interested in general promotion for the common benefits to be obtained, individually and collectively. The office of the executive secretary has been developed with system and the purpose of affording every character of information that would be in any way beneficial to the members of the organization, or to those who were interested in any use of electric machines, either for pleasure or for business.

The third paper of the afternoon was "Utility of the Electric Vehicle, Pleasure and Commercial", by E. J. Bartlett of the Baker Motor Vehicle Company, which was read, in the absence of Mr. Bartlett, by Frank J. Phelps, New England representative of the company.

Discussion followed these three papers, the discussion being taken up at the conclusion of the presentations, and the different subjects were considered from varying aspects.

At the conclusion of the session the delegates present were photographed in a group outside the club, and then they were taken in cars to the service station of the Edison Electric Illuminating Company of Boston, in Massachusetts avenue, where they were guided through the splendid gasoline and electric garages of this concern, which are rated as being the best designed and equipped in the world. The tour of the garages and some of the departments of the stations occupied the time until 6, when the company, then numbering nearly 100, partook of a beefsteak dinner in the station restaurant.

Relative Fields Considered.

The evening session was also presided over by Day Baker, and following the transaction of several matters of business, Instructor H. F. Thomson of the electrical engineering department of the Massachusetts Institute of Technology, who has been in charge of the transportation research work of that institution for several years, spoke very interestingly on "The Relative Fields of Electric, Gasoline and Horse Trucks". The talk was in the nature of explanation

of charts that were compiled in connection with investigations made under Mr. Thomson's direction and these were illustrated on a screen, showing determinations as to the relative economics of these vehicles in averaged service. In connection with the statements made Mr. Thomson illustrated the means of obtaining and recording data, and the manner of reaching determinations through plotting curves on charts that were made up of individual records of work.

From these the conclusion was that each type of vehicle was most economical within specified distances, and beyond stated radii the advantage was lost, and that this first recognized the horse, then the electric vehicle, and then the gasoline machine. In connection with this the different items entering into the reports and included in the conclusions were shown.

The statement was made by Mr. Thomson that this research work was made possible by contributions by the Edison Electric Illuminating Company of Boston, and the interest that had obtained, and the character of information developed, amply justified the continuance of the investigations. The experience was of material benefit and would be of much practical assistance in the continuance of the work.

Long Distance Touring.

"Touring by Electric Automobile" was the subject dealt with by J. S. Codman of S. R. Bailey & Co., he devoting a short paper to the possibilities of long distance journeys, referring specifically to several runs made by Col. E. W. M. Bailey and to the Boston-Chicago tour, made Oct. 14-31, during which the daily stages were from 45 to 173.5 miles, covering in all 1305.5 miles. This tour was told of in detail, giving the starting time, elapsed time, miles, miles an hour, ampere-hours used, ampere-hours used a mile and the time of arrival for each stage. The actual driving time was 83.5 hours, the average speed was 15.6 miles an hour, the total ampere-hours used was 4099, and the average of ampere-hours a mile was 3.14.

He also referred to a run of an electric roadster between Boston and New York City, May 14-15, 1914, in which a distance of 247.8 miles was covered in 23 hours and nine minutes elapsed time, with actual driving time of 10 hours and 52 minutes, the average speed for the distance being 22.8 miles an hour. This was the first run of an electric machine between these two cities within 24 hours. The machine was a stock Bailey roadster, equipped with 60 A-5 Edison cells as a battery.

Other Papers Presented.

"What Constitutes a Good Electric" was the title of a paper read by A. C. Fech of the Rauch & Lang Carriage Company, Cleveland, O., and this dealt largely with the qualities that were desirable in a pleasure car, everything depending upon the design to obtain speed, comfort, endurance and economy of operation; the material that must be used to insure strength, lightness, mileage and long life; the equip-

ment that is necessary to insure simplicity of operation and absolute certainty of control, and finally the practicality in usage in both city and country service. In this the statement was made that the vehicle that will give the greatest satisfaction is no cheaper when measured by price, but economy must be regarded from the value of the service and the period of time that a car will be serviceable with normal use.

In the absence of Hayden Eames, president of the Standard Electric Company, Detroit, Mich., his paper on the "Recognition of the Electric" was read by Charles H. Miles, business secretary of the section. This reviewed the development of electric vehicles in differing service and for pleasure use and showed how the machines have been constantly and consistently perfected from principles scientifically established and which have never been varied from. The electric machines used for highway purposes have not been promoted through superiority as demonstrated by racing or contests of any kind, but have been firmly established in the minds of thinking people because of their utility, dependability and endurance in all manner of working conditions. The electric machine is becoming better understood, and its all-round good qualities are very generally realized. The electric vehicle has never been an experiment. What has been done has been actual development, but those who failed to obtain results with the earlier vehicles were largely at fault themselves, for they were responsible for the care and attention and maintenance, and they refused to use the machines so as to obtain their greatest utility.

Mr. Eames was extremely confident that the electric machine would eventually be used for innumerable purposes because of its material advantages for work and for pleasure in conditions that are general, and that the demand would be not because of enthusiasm born of competition, but through clear understanding of its qualities for all-round purposes and for its economy.

Discussion of the papers brought the meeting to a conclusion.

The third and closing session took place at the Engineers' Club the following morning, Chairman J. A. Hunnewell presiding. Prior to the speaking a resolution was passed authorizing the appointment of a committee to wait on Governor Walsh and to urge upon him the desirability of his preventing the enactment into law of the bill then before the legislature of Massachusetts, increasing the taxation of motor trucks. This motion was unanimous, it being the sense of the convention that the legislation was unreasonable, unconstitutional, and would impose a burden upon freight vehicle owners that was not justified by facts or conditions.

Competition, Fair and Unfair.

A. Vere Shaw of the Peerless Motor Car Company then read a paper on "Competition, Fair and Unfair", and to considerable length discussed the destructive

methods of those who sought to promote sales by adverse criticism of competitors rather than by a fair presentation of quality and merit. Not only do such selling arguments create a decided loss of confidence with the public, but they mean in instances a very great loss of good will that has been developed at great cost and was actually as substantial and necessary an asset as cash in hand. He traced the endeavors that had been made by state and national governments for the protection of the people and cited prohibitions that had been established, but there was no regulation that would prevent unwarranted and unjustified comment relative to the products of a reputable concern, unless it were possible to hold the individuals responsible for statements made, which was a difficult undertaking.

Competition that was an invitation to make comparisons of the qualities or merits of products was expected and was welcomed, and decision was inevitable that would favor one and reject others, but this did not involve and did not warrant what would not only destroy the reputation of others with those directly concerned, but would eventually lead to dissemination of statements that would continue the destructive influences. Mr. Shaw was of the opinion that the condition that had obtained so far as unfair competition was concerned was due largely to the lack of training in salesmanship, the ignorance of the products sold, the indifference of those in authority as to the methods employed, and failure to realize that the same attitude might be assumed with reference to them as they tolerated with their selling representatives as regards others.

Carle Discusses Salesmanship.

"Weak Links in Electric Truck Salesmanship" was the title of a paper read by F. Nelson Carle, advertising manager for the General Vehicle Company, which discussed to considerable length the possibilities for the improvement of selling organizations, viewing the subject broadly and showing some of the conditions that must be met and which might be materially simplified by a degree of co-operation that is not impractical, and which could only be productive of material benefits.

He emphasized that each branch of the electrical industry has its problems, the capitalist, the construction engineer, the central station manager, the electric vehicle manufacturer and his salesman all finding obstacles that at times become intensified and assume extreme proportions. These may be said to be details of each separate occupation, each differing from those of the other and yet having the need of attention. The capitalist must have adequate returns for his investments, and he must be satisfied by his managers. The central station manager must endeavor to satisfy all interests with whom he is in contact and yet make his plant productive. The electric vehicle manufacturer and his engineers and salesmen must produce and sell what will at least insure a satisfactory profit.

The sales manager of the electric truck manufacturer is expected to produce sales, no matter what the conditions or the competition, whether this be from the horse, the delivery contractor or from the trade. The district managers and the local salesmen have their work to do, and they have to deal with prospects until the actual buyers have been reached by the process of elimination, there being a reduction of from about 100 to perhaps 16 who might be regarded as gilt edged, and they in turn are reduced to seven who are converts to electric vehicles. Assuming that two of these are lost by competition, differences on price, delivery date or design, and that one sale is forfeited through an executive changing his mind and another lost because of the absence of garaging and charging facilities, this leaves three actual buyers, and when the sales have assumedly been made the matter of details, body dimensions, because of the chief engineer insisting on a certain charging apparatus, and finally the matter of changing a battery specification when the third machine is on the car, bring about complications that call for not only the time of the salesman, but the district manager, departmental heads and all kinds of diplomacy and tact to consummate the transactions.

Selling in New England.

The point that was impressed upon the convention was that selling any kind of an electric truck in New England was not an easy task, and while in time many of the 100 firms referred to will buy, and reorders will be received, many of those who advocate the use of electric vehicles do not realize that the manufacturer must work on a prospect for an average of 21 months before getting the first order. When the machine is placed in service it is watched closely by others, who will admit that orders depend upon the success of the truck observed, so that all initial trucks sold are a huge responsibility, and this responsibility adds to selling expense and thus reduces the net profits.

Because of the statements made, which emphasized the problems that the salesman has to deal with, the speaker did not apply his comment specifically, but in a broad way, referring to the possibilities of developing various lines of business through a better and more general trade knowledge, which would afford an increased number of prospects. He maintained that such increased knowledge would insure a better and a more productive market and there would be more diversified distribution. He emphasized the necessity of co-operation between the truck manufacturer's sales force and the smaller central station, and between the accessory salesman and the truck buyer. This should be developed to the highest point possible because of the elimination of conditions which now result from lack of knowledge or understanding of attitudes. How far this co-operation should extend is only limited by the willingness of such factors to serve their own interest, and to rely

upon each other to do whatever is necessary to promote the work.

The fact that salesmen are disposed in some instances to accept an order for what a customer thinks he wants, rather than for what experience demonstrates that he ought to have may be resultant of the order being dependent upon the buyer's demand for something that he may believe practical and which, as he is paying the bills, he assumes he is justified in expecting. Experiments, however, are dangerous in the sense that results cannot be assured and the quality of the machine is judged by others by what is actually done with it, no allowance being made for the poor judgment of the purchaser. Another possibility is that of building special machines which may be impractical, and even if built must cost additional price. Trade deals by agents might mean temporary profit, but decided retardation to the use of vehicles in the particular vicinity in which such transactions took place. There is no doubt that there are good prospects in the smaller cities and large towns, and these can be developed quite as well as those in the large communities, and because of limitations of sales organizations these are frequently neglected.

Exchange of information in the possession of the selling force would undoubtedly make possible satisfactory handling of problems that had been dealt with by one or more salesmen, and the value of this cannot be too greatly estimated. Co-operation in the accumulation of such information and the proper distribution of it will mean much greater results. The broad proposition of promotion means that each interest should build and not destroy, should advocate electric vehicles generally without reference to one make, type or design of machine, battery or equipment.

Mr. Carle emphasized the necessity of the sales of standard makes of trucks because the manufacturers need to produce vehicles in as large numbers as possible, for larger production reduces the manufacturing cost and directly benefits the buyers, increases the possibilities for distribution and generally broadens the market. By this was meant that if there were 1000 electric trucks in use in New England the sale of each succeeding 1000 would be easier and the machines would become recognized as standard equipment because of numbers. He believed that standard designs mean quite as much to the buyer as to the manufacturer because of the lessened cost, the greater economy of operation, care, maintenance and upkeep, and he pointed out that where a central station or a battery salesman endeavored to obtain modification of specifications neither are promoting quantity production in a broad sense, because "specials" mean retardation of the work in any concern where standards are the rule. With the construction of vehicles in larger numbers better sales organizations, more concentration of endeavor, more attention to the prospects, and greater opportunities for thorough co-operation would develop, which would be

to the advantage of the industry in many ways.

An open business forum, conducted by Converse D. Marsh of New York City, was the concluding activity of the convention. Following this the delegates were taken by machine and special cars to the Relay house, Nahant, where the afternoon was given over to a baseball game, which was won by the representatives of the central stations, who played the team composed of electric vehicle interest. In the evening there was a dinner at which about 125 were present, and at which Day Baker, treasurer of the Electric Vehicle Association, presided.

DETROIT EXECUTIVES' CLUB.

Members of the Detroit, Mich., Board of Commerce have organized an Executives' Club for the purpose of studying and promoting efficiency in all branches of manufacturing and commercial enterprises, and the organization will be directed by E. St. Elmo Lewis, advertising manager of the Burroughs Adding Machine Company, who is widely known because of his writing and lectures on business subjects. The club is limited to 50 members. The active work of the club is promoted by Boyd Fisher, who was formerly associated with the Efficiency Society of New York City, having been temporarily engaged by the Chamber of Commerce to develop the different lines of activity in which the organization will engage.

The membership charges will be determined from time to time by the executive committee, and will depend upon the operating expenses. Any subject taken up will be exhaustively studied and reported in such a manner as to have real value to the firms representing the membership, and possibly to others. The club has requested the Board of Commerce to employ a member of its staff who shall devote his time exclusively to the work of the club and whose salary and expenses shall be paid from the funds of the club.

The first two activities of the club will be a thorough survey of the firms in Detroit that are studying and applying the principles of efficiency to the operation of their business, and an exhaustive study of the subject of profit sharing plans which have been adopted by various industrial and business enterprises, not only in this country, but in Europe. The expectation is that next fall and winter the club will develop an extensive programme of educational work, which may be participated in, not only by members of the club, but by departmental heads of their own and other firms.

POWER DUMPING TRUCK.

Five-Ton B. A. Gramm's Machine Supplied with Oil Hydraulic Pump Hoist.

The Gramm-Bernstein Company, Lima, O., builder of B. A. Gramm's trucks, is now producing power hoist dumping body installations for these machines, which have been demonstrated by continued operation to afford excellent satisfaction and a large measure of economy. The chassis is a standard construction, but it is fitted with the extra equipment necessary to operate the power hoist, which is manipulated by the driver from his seat.

The design of the truck is such, however, that the weight of the load is unusually well distributed, and there is a considerable percentage of it carried forward of the rear axle, yet the body is so installed that it can be elevated to an angle of 40 degrees, this being sufficient for all practical purposes. Back of the driver's cab is mounted a cylinder filled with oil, and the piston rod carries at the upper end a cross arm with a large sheave at either end. Wire cables anchored to the chassis frame are carried over these sheaves and are attached to arms projecting downward from the forward end of the body.

Oil is used in the piston and this is circulated from the upper side of the piston and forced into the lower end of the cylinder by a gear pump that is driven by the propeller shaft ahead of the transmission gearset. As the piston is forced upward in the cylinder the body is carried upward to the extreme elevation, where it automatically stops and the oil will bypass when a certain pressure has been reached. By releasing the oil pressure after the body has been elevated the piston will fall to the bottom of the cylinder, the oil having a cushioning effect. The bodies are built of steel, with all joints welded, and with frames of steel angles. The standard body capacity is 110 cubic feet, or slight-



Five-Ton B. A. Gramm's Truck Chassis Equipped with Hydraulic Hoist and Steel Body for the Use of Contractors and for Heavy Material Haulage.

ly more than four cubic yards, but these are varied according to the weight of the material to be generally hauled. By operating the dumping mechanism when the truck is moving the loads may be distributed to any depth by varying the elevation of the body. The illustration shows a truck unloading crushed stone for hand spreading.

This truck was demonstrated for a firm operating a stone quarry in Lima, O., and in 3.5 hours it did as much work as could be done with a team of horses and a cart in 15 hours, and the economy was figured to be, on this basis, about \$16 for the work. The delivery of a yard of stone by truck is frequently as low as 12 cents, against an approximate cost of from 40 to 50 cents with horses and cart.

"GMC TRUCK TALK".

"GMC Truck Talk" is the title of a little magazine, the publication of which has been inaugurated by the General Motors Truck Company, Pontiac, Mich., which is edited by John Baird, who is connected with the sales and the advertising departments. The print is to be issued once a month, perhaps oftener, and it will be devoted to the dissemination of information that will be promotive of power wagons for freight haulage, both gasoline and electric, and especially of the service in which the GMC machines are used. The first number of the magazine is well designed, has some admirable illustrations, a diversity of interesting subjects that deal with different uses of GMC machines, several descriptions of services with both electric and gasoline trucks, and some comprehensive statements relative to the selling policy of the company.

The presentation of the attitude of the company toward its patrons is well worth reading, as this defines the fact that it warrants the machines against any form of defective material or defective workmanship, and that it co-operates with the buyers in every way that is practical, but it does not promise or guarantee that repairs shall be made free, regardless of how these are caused, while the prices charged for the vehicles are such that there is a substantial difference as compared with those of similar capacity found in the market. The company sells either gasoline or electric trucks. Which is purchased is immaterial, but it is in a position to sell that which will afford the best service for a given work. The statement is made by the company that it makes a truck to fit any business, and is in a position to deal with any problem or condition.

The gasoline motor truck division of the New England district of the General Vehicle Company's sales organization has been placed in charge of George H. Hudson, who was formerly connected with the American Locomotive Company and was active in the distribution of Alco trucks.

ELECTRIC TOURING BOOK.

The New York Electric Vehicle Association, Irving place and 15th street, New York City, a Metropolitan body affiliated with the Electric Vehicle Association of America, which has for its principle object the general promotion of the use of electric pleasure cars and freight wagons, has published a handsomely designed booklet entitled "Electric Touring", in the interests of the users of electric vehicles. The book consists of 54 pages of text, indicating seven tours, which start from and return to New York City, these being by careful routes and reaching resorts that are within the touring capacity of the electric pleasure car, giving route directions, distances between points and total mileage, as well as alternate routes.

The text of the book is given over to route descriptions, the longest drives being to Poughkeepsie, N. Y., at the north, New Haven, Conn., at the east, and Trenton and Atlantic City at the south, and the places where battery charging is available in the towns and cities passed through are carefully specified. With this book at hand the distance to the next charging station is stated, so that a tourist can be certain of advantageously using the power that is stored in the battery. Included with the book is a map that defines the tours, designating these so that they may be instantly identified and followed, and the places where the charging stations are located are noted by red stars.

This book is distributed through manufacturers and agents for electric machines and will be sent free to any electric vehicle owner who will make request. While the association has previously published books designating charging stations and giving distances between principal points within a given radius of New York City, this is the first touring book that has ever been compiled for the benefit of electric vehicle users.

New agencies for Koehler delivery wagons have been made with W. Lennie Smith, Alexandria, La.; Edward L. Waybrant, New Bedford, Mass.; J. H. Timberlake, Steubenville, O.; Bridgewater Inn Garage, Bridgewater, Mass., and W. L. Brown, Dothan, Ala.

The Business League of Oconomowoc, Wis., and the Chicago Rotary Engine Company of Chicago, Ill., are negotiating relative to the company locating in that town, the basis of this being the investment by Oconomowoc citizens in the company to the extent of \$20,000.

A considerable number of agencies for the Horner motor trucks were established by R. A. Parker, assistant sales manager for the Detroit-Wyandotte Motor Company of Wyandotte, Mich., during his recent tour of the southern states.

BUYS 20 PALMER-MOORES.**Big Order of Delivery Wagons for Parcel Distribution About Boston.**

The Palmer-Moore Company, Syracuse, N. Y., has made contract with the Clearing House Delivery Company of Boston, Mass., for the delivery of 20 Palmer-Moore wagons for service in Boston and its suburbs, and half of this number is to be delivered in June, the others to be shipped at specified dates. This is maintained by the Palmer-Moore Company to be one of the largest single orders received this year by any manufacturer, and is considered by the officers of that company an evidence that there is a return to improved business conditions.

The contract was made by President T. G. Meacham and Sales Manager J. W. McCrea, and it is stated that the purchase was decided after careful investigation into the qualities of different machines as demonstrated by service, in which attention was directed to engine control, flexibility of motor, tire economy, ease of handling in congested traffic and generally meeting the requirements of the greatly varying work of the company.

The body to be installed on the chassis is a four-post express type with roof extending over the driver's seat to the dash, with wire screen sides and screen end gate, with side and end curtains that may be used in the event of storm. The roofs of the bodies are to be adapted for the carrying of rolls of carpet, rugs, etc., by there being a rail surrounding the space in which freight can be thus carried.

The Boston Clearing House Parcel Delivery Company does a general contract distribution of goods for stores in Boston, its service extending into the suburbs in all directions. It utilizes in all a considerable number of vehicles, both delivery wagons and trucks, these being used for collecting the goods and distributing them, and a very large area is covered.

The head of the company is E. B. Strickland, who states that the Palmer-Moore machines had in all trials that had been made with them given excellent service, they being required to make a daily average of 80 miles, carrying varying loads.

The Standard Motor Truck Company, Detroit, Mich., is now occupying its new plant at 496-500 Bellevue avenue, that city, where it has greatly increased facilities for every department, and where the production can be more economically and satisfactorily made.

The Indianapolis, Ind., office of the Willard Storage Battery Company of Cleveland, O., has been removed from the Pythian building to 318 North Illinois avenue, where in addition to the salesroom complete charging and service station facilities have been installed.

COL. CLIFTON AGAIN PRESIDENT.**Will Continue as Head of the National Automobile Chamber of Commerce.**

The activities of the National Automobile Chamber of Commerce, and of the bodies that preceded it, have been influenced largely, and in many instances directed, by Col. Charles Clifton of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., who has been for years one of the most prominent figures in the American automobile industry. For a number of years he was a member of the committee that organized the annual New York shows, and has been especially active in practically every undertaking of importance to the association.

At the annual meeting of the body Col. Clifton was again chosen to serve as president, he having so satisfactorily directed the organization that he was the unanimous selection of the membership, and at this gathering 74 concerns were represented, this being the largest meeting ever held in the history of the industry. The unification of the principal firms manufacturing motor vehicles may be judged from the number that was represented at this meeting.

The officers chosen were as follows: President, Col. Charles Clifton, Pierce-Arrow Motor Car Company, Buffalo, N. Y.; vice president, Wilfred C. Leland, Cadillac Motor Car Company, Detroit, Mich.; second vice presidents, Hugh Chalmers, Chalmers Motor Car Company, Detroit, Mich., representing the gasoline vehicle division; Windsor T. White, the White Company, Cleveland, O., representing the commercial vehicle division; H. H. Rice, the Waverley Company, Indianapolis, Ind., representing the electric vehicle division; secretary, R. D. Chapin, Hudson Motor Car Company, Detroit, Mich.; treasurer, Col. George Pope, Pope Manufacturing Company, Hartford, Conn.; general manager, Alfred Reeves; directors, S. T. Davis, Jr., Locomobile Company of America, Bridgeport, Conn.; C. C. Hanch, Nordyke & Marmon Company, Indianapolis, Ind.; Alvan Macauley, Packard Motor Car Company, Detroit, Mich.; W. E. Metzger, American Electric Car Company, Saginaw, Mich.; H. O. Smith, Premier Motor Manufacturing Company, Indianapolis, Ind.; Albert L. Pope, Pope Manufacturing Company, Hartford, Conn.; L. H. Kittredge, Peerless Motor Car Company, Cleveland, O.; John N. Willys, Willys-Overland Company, Toledo, O., and E. R. Benson, the Studebaker Company, Detroit, Mich.

W. H. Woodward, A. W. Woodward and L. O. Corser are the incorporators of the Vehicle Spring Supporter Company which has been organized at Boston, Mass., with capital of \$50,000.

The Tuthill Spring Company, Chicago, Ill., has established W. A. Friese at Detroit, Mich., as its Michigan representative.

NEED OF UNIFORMITY OF MOTOR LAWS.

GOOD highways, in the general sense of the term, appear to have the approval of every citizen, and in practically every instance where proposals to appropriate large sums of money have been made approval has been forthcoming. But while there is a favorable sentiment throughout the nation for the construction of good roads, there is not as yet an apparent realization that once a highway has been built it will require constant supervision and expenditure to maintain it, largely in ratio to the character and volume of traffic to which it is subjected.

In America there are today not far from 1,500,000 motor vehicles of all kinds. Of this number about 100,000 are used for freight purposes, and the remainder are pleasure cars, used to a considerable extent in business, and motorcycles. But, large as this total is, one, to understand the conditions, must realize that there are about 25,000,000 animals in use, and, in all probability, 20,000,000 animal drawn vehicles so that the motor cars, wagons and trucks and motorcycles represent about 7.5 per cent. of the total users of the highways.

The national government has no control of roads save in the districts that are governed by commissions, in the Districts of Columbia and Alaska. Most of the states have some form of highway supervision, but not all of them highway systems that are constructed and maintained by them. Next are the county organizations, then the towns and even villages and boroughs, and as primarily the roads are built by taxes raised by the people the taxpayers are generally desirous of the money they contribute being expended for their benefit, with, of course, such state assistance as they can obtain through political preference or need. For instance, in some states where towns have not sufficient resources to pay for construction and maintenance of roads the states are expected to make such contributions from the funds of the commonwealths as will improve some of the main highways.

The analysis of the conditions would require a great deal of space that is not available, but the first important fact to reflect upon is that the needs of the people are very generally the same, and to provide roads for all of even an indifferent type would be impossible. To determine a road system and develop it as the funds are available appears to be the only logical conclusion, and this means that road building will continue to be one of the most important problems that the people will have to deal with. Not only this, a definite policy must be determined and followed, because there are so many conflicting interests to be harmonized and conditions that will develop must be met.

The fact that each municipality, each county and each state has its own policy, often based on political expediency, is an obstacle of immense proportions. European nations, where the law is universal, can deal

with a proposition of this character much easier than is possible or practical in America. Each state has its own laws, and these can be made applicable to any one or to all localities, locality demand often resulting in exemption. To illustrate, Maine law gives the people of certain localities the privilege of depriving the owner of a motor vehicle the right to use the roads; Massachusetts closes some of its roads to motor cars and wagons and denies the right to owners to use them on any other than state roads on the island of Nantucket; Rhode Island requires all vehicles to carry lights at night, save on the island of Block Island. One might continue indefinitely.

The uniformity of state highway law can consistently be advocated by all. The repeal of statutes that are vitally necessary can be logically urged. But the question of policy is a difficult subject to deal with. An example of what may be expected is the reception given the draft of the proposed uniform motor vehicle law submitted to the legislators of eight different states, which was rejected in every instance. There was every reason why the law should be accepted, but it was not even seriously considered.

But there are other factors of decided importance. First of all is that of engineering. Assumedly forms of construction could be determined that would be equally satisfactory wherever used, these to be suited to different materials, and supervision and maintenance ought to be with the purpose of insuring a satisfactory highway, yet few engineers are agreed on these details. The next is that of materials, but here is even wider variance of opinion, and there is also the influence of those manufacturing material who seek to create demand for their products and make advantageous contracts for the sale of them.

Beyond this is the influence of those holding public office, who might be legislated from these positions in the event of the enactment of law that would establish a better condition and make possible and practical the construction and maintenance of highways. There are those who will discount the strength of this factor, but it will be considerable. To unify all interests will be a work of large proportions and it will require a long period of time.

The American Highway Association and the American Bar Association have inaugurated a work that ought to be productive of results if those interested will create a systematic and constant campaign, and will so direct it that there will be general realization of the benefits that will obtain through the proposed amended laws. The office of public roads of the Department of Agriculture is co-operating with the two committees. A compilation has been made of the laws of the different states which relate to highway use, construction, maintenance, supervision, appropriations, expenditures, manner of collecting funds,

regulating traffic, lighting of vehicles, and other details, as well as those which relate to state or locality indebtedness and to the use of convict labor in construction and maintenance work. An index chart is being prepared, and when this is completed the committees will consider the most feasible manner of crystallizing the campaign. Requests will be made of the governors of the different states that they make recommendation to the legislatures of the respective commonwealths that special committees be appointed with authority to confer with the committees of the American Bar Association and the American Highway Association, the purpose being to revise the laws and endeavor to draft one statute that can be recommended to each state legislature for approval.

The highway traffic has increased almost beyond belief in the past 10 years, largely from the greater mobility of the motor vehicle, and the interstate communication by vehicle has reached such proportions that it must be specifically dealt with. There is every reason to believe that road transportation will be developed immeasurably within a comparatively short time, and its importance will necessitate materially changed conditions, which fact has been anticipated by the two associations that have launched the work stated.

The committees will recommend that the law that is to be drafted have certain, well established principles included in it, one of which will be the elimination of the provision contained in many ancient statutes that taxpayers may pay road taxes by working on the highways at a stated daily allowance. Another proposition will be the reduction of the officials to a number consistent with efficient administration. That there shall be the required qualifications for effective road construction and maintenance practical tests are suggested, and the employment of skilled engineers and trained highway superintendents is advocated, these to be appointive officials, instead of elective. Continuous maintenance is regarded as the only practical policy, this insuring a satisfactory condition. The utilization of convict labor wherever possible is another factor that will be approved, this being a means of minimizing cost, while state aid and supervision and practical accounting of funds are other details that will receive consideration.

The work that has been assumed by the joint committee is worthy of the consideration of every business man and citizen, for whatever will be recommended will be prepared with a view of benefiting the people as a whole, of dealing with a problem that is of immense proportions and importance, and which will undoubtedly lead to greater return for the expenditure than is now possible with the laws that are effective. The preparation of a law such as the committees will prepare would require much careful study and investigation, such as could not possibly be given by the average legislative committee, and a draft that will have the approval of the best authorities that can be

obtained is surely worthy of consideration. While it is not possible for such a law as will be drafted to deal with local conditions, it will surely comprehend the welfare of the people, and this ought to be a sufficient recommendation for it to all citizens and taxpayers.

PITTS MADE SALES MANAGER.

Alfred J. Pitts, who has been for a number of years well known as a newspaper man of Detroit, Mich., has been appointed general sales manager of the Wagenhals Motor Car Company of that city, and is now directing the distribution of the production of that concern.

Mr. Pitts, because of his work, has had abundant opportunity to observe the utility of the Wagenhals machines, a considerable number of which are in service in Detroit, and for several years followed them carefully with a view of obtaining information of value to him as a writer. The results of his observations convinced him of the enormous possibilities for the use of comparatively light and economically operated vehicles, and the advantages of the three-wheeled type in many conditions. In this connection it may be stated that the United States government, after a test covering practically a year, placed an order for 21 of these machines, and they are now in the service of the Postoffice Department.



Alfred J. Pitts, Sales Manager, Wagenhals Motor Car Company.

The Wagenhals Motor Car Company is planning an aggressive selling campaign and is now developing plans for a more extensive distribution, although it is represented in every state in the Union and in several foreign countries.

By removal from 1874 to 1851 Broadway, New York City, the Dayton Rubber Manufacturing Company, maker of the Dayton airless and pneumatic tires, has greatly increased its salesroom and improved its facilities for doing business.

The sales force of the Connecticut Telephone & Electric Company, Meriden, Conn., manufacturer of the well known Connecticut ignition specialties, has been augmented by the appointment of W. J. Johnston of Chicago, Ill.

EXPORT TRADE GROWING.

Satisfactory Increase for First Nine Months of the Fiscal Year.

Study of the exportations by the American motor vehicle industry demonstrate that there has been a reasonable increase of business as compared with the last two years, and while there has not been the same gain over 1913 that there was in 1913 over 1912, based on valuation, there has been more than the same ratio of increase in number of vehicles sent to foreign markets.

The reports are made by the United States Department of Commerce and these have been tabulated by the National Automobile Chamber of Commerce, the figures for the present year covering both imports and exports for the nine months ending with March, 1914.

The compilation shows that in 1912 the number of vehicles exported was 14,569, valued at \$14,189,948, or an average of \$973.98; in 1913 the exported vehicles increased in number to 17,330, valued at \$17,762,369, or an average of \$1024.89, while in 1914 the total was 20,471, valued at \$18,765,656, or an average of \$921.09. This will show that the actual number of vehicles was in 1913 2771 more than in the previous year, while in 1914 the actual number was 3141 more than in 1913, and 5912 more than in 1912, but because of the decreased average value the showing on valuation alone is not as great for 1914 as for 1913. The exports of parts showed a very substantial increase, while there was a falling off in the number of engines and tires exported, but the total exportations for the period exceeded 1913 by \$1,419,726.

The tabulation for the nine months shows the following:

IMPORTS.			EXPORTS.		
1912.			1912.		
Number	Value		Number	Value	
Cars 14,469	\$14,189,948		Cars 786	\$1,733,639	
*Parts	2,850,047		**Parts	240,212	
Engines 4,315	519,318				
Tires	1,869,471				
Total.....	\$19,428,784		Total.....	\$1,973,851	
1913.			1913.		
Number	Value		Number	Value	
Cars 17,330	\$17,762,369		Cars 618	\$1,434,059	
*Parts	3,587,805		**Parts	199,888	
Engines	1,591,917				
Tires	2,809,917				
Total.....	\$25,552,008		Total.....	\$1,633,947	
1914.			1914.		
Number	Value		Number	Value	
Cars 20,471	\$18,765,656		Cars 245	\$545,226	
*Parts	4,923,339		**Parts	488,730	
Engines 2,579	903,780				
Tires	2,378,959				
Total.....	\$26,971,734		Total.....	\$1,033,956	

*Except engines and tires.
**Except tires.

The exports during March, 1914, included 3508 vehicles valued at \$3,048,847, this being a gain of 666 machines as compared with March, 1913, when 2842 cars were shipped, these having a value of \$2,909,741. The lower average price of the machines is shown by the fact that while there were 666 more vehicles ex-

ported, the total valuation was but \$139,106 more. The increase in value of parts, exclusive of engines and tires, during March, 1914, was \$96,569, which was approximately 16 per cent. There was a marked decrease in imports of cars during the same period, when but 15 machines, valued at \$15,869, were brought into the country, while in the same month in 1913 the imports were 49 cars, with a valuation of \$104,714. But during the month the value of the parts imported, exclusive of tires, increased from \$15,236 to \$90,928. During April the exports from New York included 2006 cars, valued at \$1,533,305, and parts worth \$139,238.

OIL SEPARATORS—NOT YET.

The general welfare committee of the New York City board of aldermen is to give a hearing June 12 relative to the amendment of the ordinance that requires the installation of oil separators that will prevent oil and gasoline from flowing into the sewers of the city. The present ordinance has been effective for about four years, but a part of the time it was not enforced. The enforcement of the regulation brought about a very general protest from the owners of garages because of the very large expense that would be entailed were the provisions of the ordinance insisted upon, and a universal demand for amendment. The proposition was opposed by the representatives of the fire department on the ground that the ordinance was a protection that ought to be complied with, and then followed a controversy that has continued for months. The proposed amendment is now before the aldermanic committee, and in connection with this the fire department has been making a series of tests to substantiate its position. If the ordinance is not amended there will be an ultimate expense of a very large sum by the garages of the city, and the garage owners maintained that this will be without serving any useful purpose.

An explosion in the plant of the Mexican Crude Rubber Company, Detroit, Mich., destroyed practically all of the windows in the adjacent factory of the Commerce Motor Car Company, that city, but aside from this there was no damage, although 10 persons were killed and many injured in the building in which the explosion took place.

The branches of the United States Tire Company at Rochester and Syracuse, N. Y., have been discontinued, and the wholesale distribution in these two cities and vicinity will be by the Syracuse Rubber Company. The manager of the Rochester branch has been transferred to the Buffalo branch.

The American Carbon & Battery Company has been incorporated at Chicago, Ill., with capital of \$250,000, by W. C. Schramm, H. J. Vreape and H. Wrape.

WILLARD SERVICE STATION.

The new service station that has been established by the Willard Storage Battery Company, Cleveland, O., at Detroit, Mich., has available for use more than 10,000 square feet of floor space at a building at 736-40 Woodward avenue, which has been equipped with every facility for construction, repairing and charging, and for affording every attention required by users of LBA batteries. The station has available 46 charging plugs, which is sufficient for practically any demands that may be made upon it. Besides a very full line of complete batteries the salesrooms are stocked with parts and accessories of all kinds.

SPENCER DIRECTS SALES.

The sales and advertising department of the Federal Motor Truck Company, Detroit, Mich., is now in charge of R. P. Spencer, who was with Geuder, Paeschke & Frey of Milwaukee, Wis., for 10 years as sales manager, and with him is associated as assistant sales manager M. E. Kennedy, who was also connected with the same firm as Mr. Spencer as advertising manager.

PILKINGTON IS RESIDENT ENGINEER.

Robert G. Pilkington, who has been identified with the automobile vehicle industry for practically 15 years, and is widely known, who is resident engineer for the American Efficiency Survey of Motor Car Units, is now at Lafayette, Ind., where he is conducting a series of tests for that organization. In this work he has the assistance of the board of technical detail, a number of whose members are connected with the staff of Purdue University. The tests are being made in the laboratories, and cover the working efficiency of all types of the units that are generally included in the construction of a motor vehicle. Considerable special apparatus has been installed in the laboratories, some of which has been designed by members of the board, and this includes a special late type Diehl dynamometer, by the use of which tests are made of motors, carburetors, transmission gearsets, axles, universal joints, etc.

The office of the organization is located at Chicago, and the general purpose is to collate and prepare information that may be supplied to all those in need of accurate and sufficient data to meet all conditions and situations that may arise, and much of this detail is obtained from examinations and tests that will be made by its experts. The service of the office is at all times available for those who may desire information. The intention is to make the organization a potent influence for the development of design, construction and operation of all types of motor vehicles.

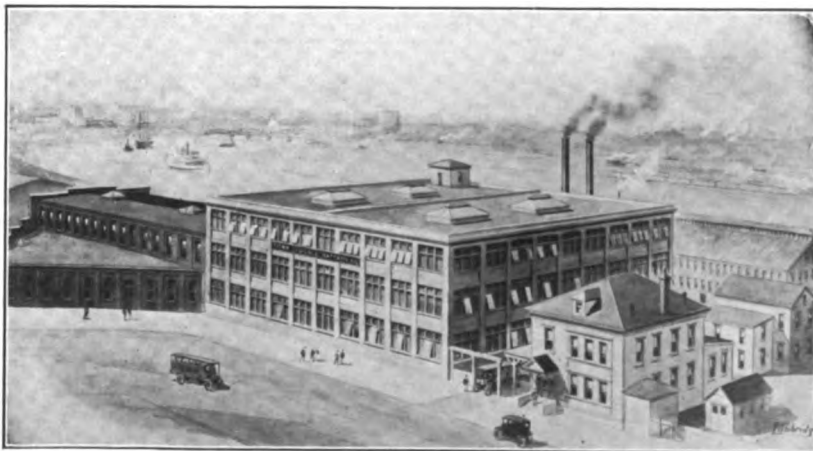
BALTIMORE BECOMES TITAN.**Storage Battery Company Changes Name and Removes to New Newark Plant.**

The concern that for several years carried on business at Baltimore, Md., under the name of the Baltimore Electric Storage Battery, and produced the Baltimore batteries, designed for vehicle propulsion and other purposes, has become the Titan Storage Battery Company, and it has been removed to Newark, N. J., where a large plant has been established at Chapel street and Lister avenue.

The offices and factory of the company were first located in Baltimore, where business was carried on with considerable success for several years, but with the increase of production necessitated by a rapidly growing demand the facilities were found inadequate and removal was decided on. Newark offered advantages that could not be equalled in Baltimore and the site in that city was secured and the offices first removed there, this being followed with the equipment of the shops to produce various types and sizes of cells.

Because there was no reason to identify the name of the company or its products with the city where it was once located, and to avoid possibility of confusion at any future period, the executives decided to change the title to the Titan Storage Battery Company and to use this name as a trade mark to distinguish its batteries, this being a very satisfactory simplification of the condition.

The officers of the concern are as follows: President, Henry M. Keith; vice president, Daniel C. Spruance; treasurer, Edward S. Hyde; secretary, Henry H. Hanson; directors, Henry M. Keith, Daniel S. Spruance, Edward S. Hyde, Henry H. Hanson, Minor C. Keith and John G. Gray; general manager, Dr. W. S. Winship; sales manager, A. R. Mustard; superintendent, Eugene Handler. The control of the company is owned by Minor C. Keith, vice president of the United Fruit Company and president of the International Railways of Central America.



General View of the New Plant of the Titan Storage Company, Recently Opened at Chapel Street and Lister Avenue, Newark, N. J.

The company continues its policy unchanged, but the purpose is to very largely increase its activities and the market for its products, which will be a general line of cells for vehicles, lighting, ignition and engine starting of such sizes as are regarded as standards.

STEEL TREATING RESEARCH CLUB.

The Steel Treating Research Club has been organized at Detroit, Mich., by a majority of the foremen of the case hardening and heat treating departments of different industrial establishments of that city and vicinity, and the purpose is to meet once a month for the purpose of hearing talks by metallurgists and others who can deal with the scientific aspects of different metals and their treatment when used for different purposes. The organizers believed that material benefit would obtain from the exchange of ideas and experience. The membership is limited to foremen and assistant foremen of case hardening and heat treating departments, tool smiths and tool hardeners. The president is H. J. Lawson of the Cadillac Motor Car Company, the vice president is J. B. Ethier of the Detroit Metal Products Company, and the secretary-treasurer is D. W. Bauer.

BUYS 25 'BUS CHASSIS.

The service of the Fifth Avenue Coach Company, New York City, which operates a large number of motor omnibuses in Fifth avenue and several other of the principal thoroughfares of the Metropolis, is to be considerably expanded by the additions that the company will make to its equipment. The company has placed an order for 25 De Dion-Bouton chassis suited for omnibus body installation, which will be delivered in August, and will be placed in operation as quickly as possible. This spring the company made a similar purchase and the 25 chassis then contracted for were recently placed in service.

The directors of the Lee Tire & Rubber Company, Conshohocken, Penn., have elected A. A. Garthwaite, who was vice president and treasurer, as president; John J. Watson, Jr., first vice president, and H. C. Coleman, treasurer. The directors of the company are: J. Elwood Lee, Samuel Wright, M. O'B. Hallowell, Charles H. Clark, J. Carl de la Cour, H. C. Jones and John M. Fettra.

An addition 60 by 90 feet is to be made to the factory of the Kelly-Springfield Motor Truck Company, Springfield, O., which will be given over to the testing and shipping departments of the concern. The work is to be begun immediately.

The Durant-Dort Carriage Company has appointed Charles H. Pier travelling representative for the states of Michigan, Indiana and Ohio.

HEAVY HAULAGE COST.

Economy Resulting from Use of Six-Ton Garford Truck by Contractor.

The possibilities for economy with motor trucks are largely dependent upon the judgment of those operating them, and where a machine can be worked with capacity loads and the handling of the freight is done so as to economize the time of the vehicle, there is no doubt of the results so far as saving is concerned, while the length of service is dependent upon the care and attention that is given.

Those who carefully observe the work done with a truck are usually interested in economy, and the data obtained from observation will undoubtedly lead to economies that are entirely practical and will give the largest measure of results during a stated period or for a given expense.

A decidedly interesting statement is made of the work of a Garford six-ton truck that is used by one of the largest contracting firms in the United States, and which has in service 13 machines of this make. The work is diversified and the requirements of each job will vary greatly. The report of service covers a period of 106 working days, during which time the machine was driven 3997 miles, an average of 37.7 daily. The number of trips was 420, the average being a trip of 9.52 miles, and 3.96 trips were made each day.

During a period of 106 working days a total tonnage of 2302 was carried, this giving an average load of 5.48 tons, and the number of ton-miles was 10,951.78. The fuel consumption was 1504 gallons of gasoline, which showed an average of .37 gallon a mile, at a cost of 4.1 cents a mile.

In ascertaining the cost of this particular service, and assuming the average load carried to be 5.5 tons, the company found the cost for haulage of sand, gravel, stone and other material was 6.1 cents a ton-mile, this showing the entire cost of operation to be approximately \$12.65 a day. It will be noted that the machine was worked well within its limitations so far as loading was concerned, so that there was logically a minimum service wear. The length of the haul was approximately 4.75 miles, and two round trips would have been somewhat in excess of what would be allowed for a day's work for animals, while the truck not only made four trips, or twice the number that could be made with horses, but the tonnage carried each load was practically double what the animals would have hauled. The statement is made that these figures show a saving of practically 100 per cent. when compared with the best data available of similar work with horse carts.

The Imperial Brass Company, Chicago, Ill., has opened an office at 601 Stevens building, Detroit, Mich., in charge of James T. Greenlee.

DIGEST OF AMENDED REGISTRATION LAWS.

IF THE results of the annual crop of motor vehicle legislation in the different states be regarded as a basis on which to formulate judgment there is reason to believe that the people are becoming better informed as to conditions and are less radical in their demands, or the legislators are inclined to regard the influence of the motoring public as a very important factor politically.

But whatever may have been the reason for the apparently changed attitude of the legislators, there is no doubt that while the number of measures amending or creating law was larger than ever before, the number that was passed was comparatively small. Legislative sessions were convened in Kentucky, Maryland, Massachusetts, Mississippi, New Jersey, New York, Ohio, Rhode Island, South Carolina and Virginia, and of these all save that of Massachusetts have adjourned. There will be one other legislative session begun before July 1, in Georgia, which will assemble June 27. The Louisiana legislature was convened May 11 and is now in session.

Statement can be made of the law enacted in all the states with reasonable assurance, for there are but two bills now pending in Massachusetts and there is no probability that there will be material change in the measures as they have been reported by the committee.

Reciprocity in Massachusetts.

Greater interest may be attached to the Massachusetts legislation from the fact that in all 48 bills relating to motor vehicles were introduced, six of these in the Senate and 42 in the House, and these were referred to the committee on roads and bridges. This committee sifted these through the usual hearings and the result is that five bills have been passed, and the remaining 43 have been placed carefully in the archives of the committee.

Of the bills passed, one provides for reciprocity with non-residents, permitting the motorists of other states that grant similar privilege to residents of Massachusetts to enter the state as frequently and remain as long as they desire, but it does not apply to summer residents. The interpretation of this law is that the wagons and trucks of business men of other states that are registered in the states where the owners reside or do business can enter the state without Massachusetts registration, provided the same courtesy is granted the Massachusetts business men by these states.

This is in itself of material importance, for the interstate commercial interests are increasing rapidly and until now the vehicles used in Massachusetts and other states have been required to be registered in Massachusetts and elsewhere, this necessitating the payment of a double registration fee, which is of considerable proportions, especially as the disposition of

the legislators has been to increase the registration tax for freight machines. While the law applies to all states, it will materially affect the business men of New Hampshire, Vermont, New York, Rhode Island and Connecticut, making possible the operation of their machines for one registration tax instead of two, and at the same time there will be a similar effect for Massachusetts owners. With reference to summer residents, if they propose to remain in the state more than a month they will be required to take out a summer registration license.

Increasing Truck Fees.

Two of the other laws enacted respectively prohibit the use of muffler cut-outs in thickly settled sections of cities and towns, and require lights to be carried by all vehicles using the highways of the state at night. But of the other bills that which is of the greatest interest to owners of trucks and wagons is that which increases the registration tax for all freight vehicles from a flat rate of \$5 a machine to \$5 for one ton capacity or less and \$3 for each additional ton capacity or fraction thereof. This bill, for instance, will tax a five-ton truck \$17 instead of \$5. The original bill fixed the rate at \$5 for wagons of one ton capacity or less and \$5 for each additional ton. This measure is the pet of the Massachusetts Highway Commission and has been urged by it for several years. Last year the same bill was advocated and a compromise was made by a committee of motoring interests of \$5 for the first ton or less and \$2.50 for each additional ton or fraction, but the commission repudiated the agreement and insisted on the original measure being passed. The motorists succeeded in defeating the bill when it was placed on passage.

The members of the highway commission state that the purpose of the bill is to increase the revenue of the state, and yet the amount raised will not be very large if the bill becomes law. There are now approximately 6050 wagons and trucks registered in Massachusetts, and of these 2100 are of one ton or less, 1000 or more than one ton and not more than two, 1000 are of more than two tons and not more than three, 1100 are of more than three tons and not more than four, and 850 are rated from four tons upward. A rough estimate of the revenue from the bill as originally presented would be on a basis of 7000 machines and approximately \$125,000, but as amended and now before the legislators the revenue would be about \$70,000, and at the flat rate of \$5 the revenue would be \$35,000. The criticism of the bill pending is that it does not increase the tax on the small vehicles, but does increase the tax on the larger from 60 to 300 per cent., or even more with the machines with capacity of six tons and over. In one instance, where a truck and trailer with 12 tons capacity is used the tax with the amended law will be \$38, this being an increase of

660 per cent. in the registration tax.

Whether or not the motoring interests will be successful in securing the veto of the bill by Gov. Walsh, this measure is uncertain, but the levy of a special tax for use of the roads with vehicles that are necessary in business, and which are further taxed as personal property, is not regarded by the citizens generally with favor.

The other bill, which is of much less importance, requires motorcycles, after Jan. 1, 1915, to carry two identification numbers instead of one, and establishes that a motorcycle with a sidecar attachment shall be classed as an automobile for the purposes of registration and will pay an automobile registration tax.

Registration in Kentucky.

In Kentucky five bills were presented in the Senate and nine in the House, and of these but one became law, this relating chiefly to registration fees, these being \$6 for vehicles of 25 horsepower or less, \$11 for vehicles from 25 to 50 horsepower, and \$20 for machines of more than 50 horsepower, and \$5 for motorcycles.

Six bills were introduced in the Maryland Senate and 16 in the House, three of which became law. Of these the only one of importance limits speed to 35 miles an hour, limits trucks weighing from four to eight tons with load to 15 miles an hour, those weighing more than eight tons with load to 12 miles an hour, and traction engines to six miles an hour. The bill fixed 14 tons as the maximum road load, the extreme vehicle width as 90 inches and the maximum weight to the inch of tire width as 800 pounds.

Mississippi's "Privilege Tax".

In Mississippi, where the registration law was last year declared unconstitutional by the supreme court in that it created double taxation, three bills were introduced in the Senate and four in the House, two of these being passed. Registration is, by one bill, defined as a "privilege tax" and fixes the tax for motorcycles at \$2.40, electric vehicles at \$4.80, service vehicles of 4400 pounds capacity or less at \$8.40, and exceeding this capacity \$16.80, and all other motor vehicles (pleasure cars) at 36 cents a horsepower. In addition a flat fee of \$2 is charged for registration number plates.

The New York Senate received 15 bills and the assembly 18, of which three were passed. Two of these were signed by the governor and the other was vetoed. One of these makes violation of the New York City traffic regulations a misdemeanor. A bill to include motorcycles in the general automobile law was vetoed.

In New Jersey the Senate received nine bills and the House 15, and four of these passed, one of the four being vetoed. One of the three authorizes the exclusion of motor vehicles from parks and limits the speeds permitted in parks. The bill proposing exemption of motor vehicles from personal property taxation and increasing the registration fees was not

passed, and the bill authorizing the commissioner of motor vehicles to increase the number of special inspectors was vetoed.

Ohio and Rhode Island.

But one bill was passed by the Ohio legislature, this being a law re-enacting the principal provisions of the statute that obtained when the Warnes law was declared unconstitutional, fixing the fees for registration at \$2 for motorcycles, \$3 for electric vehicles, \$5 for all other motor vehicles and \$20 for dealers. This bill requires the examination of drivers and fixes a fee of \$1 for a driving license.

The Rhode Island Senate received six bills and the House six, of which one, requiring lights on all road vehicles at night and another increasing the registration tax on wagons and trucks, were passed. The rate for service wagon registration was increased from a flat rate price of \$2 to \$7 a vehicle.

Local Licenses Permitted.

The South Carolina Senate had two bills before it and the House five, and of these two were passed, both authorizing special automobile license and registration tax in Beaufort and Oconee counties for the purpose of increasing the funds for highway improvement.

The Senate of the Virginia legislature considered eight bills, and the House received a similar number, four of these being enacted into law, and one of the four was vetoed. The only measure of interest was that prohibiting the use of any truck, tractor or traction engine with wheels fitted with spikes, cleats or lugs that would disintegrate the surface of a roadway treated with a bitumen or other binder. The other bills relate to special county registration licenses for benefit of highway funds.

Louis Ruprecht, who was district manager for the General Vehicle Company at Philadelphia, Penn., for a considerable length of time, resigned that position June 1 to become manager of the Brady-Murray Motors Corporation, distributor of Chandler passenger cars, with headquarters in New York City and branches at Brooklyn, N. Y.; Hartford, Conn.; Newburg, N. Y.; Newark, N. J., and Plainfield, N. J. Mr. Ruprecht has been identified with the automobile and motor vehicle trade for 12 years and is widely known.

The Saratoga Vichy Springs Company, Saratoga Springs, N. Y., which distributes bottled mineral water, has purchased two of the Palmer-Moore 1600-pound delivery wagons, which are equipped with the standard open express bodies, but have cabs over the drivers' seats. These machines are fitted with water-cooled motors. These wagons are specially finished and have a very neat appearance.

The General Motors Truck Company has appointed H. M. Paine, president of the Paine Automobile Company, superintendent of the service department of its St. Louis, Mo., branch.

ELECTRIC VEHICLE ASSOCIATION ACTIVITIES.

ANNOUNCEMENT is made that the annual convention of the Electric Vehicle Association of America will take place Oct. 19, 20 and 21 at Philadelphia, Penn., these dates having been decided on after consideration of the work that will be done by the delegates. The previous conventions have been held at New York, Boston and Chicago, and Philadelphia was the first choice, its delegates having invited the organization to meet there before the Chicago meeting was adjourned.

Two days had been given over to the conventions in previous years, but because of the nation-wide interest in electric vehicles and the many subjects that are now receiving attention, the committee has had difficulty in planning the programme so that it can be disposed of in three days, which is the time allotted. The committee is now working out a tentative programme, which will shortly be announced, and when this has been decided on the plans for the convention locally will be determined by the Philadelphia committee.

The meeting of the New York section, which was held the evening of May 22 at the Auditorium at 130 East 15th street in that city, through the courtesy of the Consolidated Gas Company, was of unusual importance, for the subject for the evening was "The Electric Vehicle in Parcel Post Service for Economy and Reliability". The general subject was presented by S. G. Thompson of the Public Service Electric Company, Newark, N. J., who was followed by Frank W. Frueauff, chairman of the parcel post co-operative committee of the National Electric Light Association, who described the work accomplished and the plans of his committee from the viewpoint of the electricity supply companies, and by James H. McGraw, chairman of the parcel post delivery committee of the Electric Vehicle Association, who discussed the endeavors of his committee and the great influence of the development.

In addition a number of persons identified with the electric vehicle industry reviewed the subject from differing angles. The meeting was open to all interested and a free consideration of the subject was entered into.

Announcement is made that the association now has seven sections located in New York City, New England, Chicago, Philadelphia, Washington, Cincinnati and San Francisco. The last four sections have been organized since the convention at Chicago last October, and the membership has increased very rapidly. There is an organization of electric vehicle interests at New Orleans, which was promoted by representatives of different concerns in the industry, and there is reason to believe that this will shortly seek affiliation with the association. As each section elects

its own chairman, who becomes a vice president of the association through his election, and the sections organize and conduct their own activities with relation to the needs obtaining in the part of the country in which they have jurisdiction, they are in a sense independent, but are engaged in general promotive work.

Policies that have been determined by the national organization are always followed out, but there are locality and sectional requirements that are considered and dealt with to the best advantage of the members and interests directly concerned. With sections active in the East and West, and with the co-operation of large electrical interests, there is no question that the association will have greatly increased influence and will be a much more potent factor in developing the use of electric vehicles of all kinds.

The Cincinnati section has as its officers: George Behlen of the Behlen Sons Company, chairman; James W. Schrantz of the Westinghouse Electric & Manufacturing Company, vice chairman; Parker H. Kemble of the United Gas and Electric Company, secretary. The officers of the San Francisco section are Stanley Walton of the Pacific Gas and Electric Company, chairman; C. W. Hutton of the General Vehicle Company, vice chairman; J. W. Redpath of the Journal of Electricity, Power and Gas, secretary. The other chairmen are J. A. Hunnewell of the New England section, H. E. Neisz of the Chicago section, R. L. Lloyd of the Philadelphia section and E. S. Marlow of the Washington section.

After an absence of six months in the western states, H. E. Wilcox has returned to Minneapolis, Minn., and has resumed his duties as vice president of the H. E. Wilcox Motor Company of that city. Mr. Wilcox was engaged in general promotive work during his sojourn on the Pacific Coast.

The establishment of business connections for his company, and the investigation of the European market for motor vehicle lighting and starting systems, was accomplished by C. E. Ward of the Philadelphia Storage Battery Company, during his recent European trip.

Frederick F. Colver, formerly in charge of the truck sales of the Philadelphia branch of the Locomobile Company of America, has been made sales manager of the New York City branch of that company, succeeding George H. Duck.

The Gramm Motor Truck Company, Lima, O., has appointed Thomas Burmeson, formerly manager of the New York City branch of the Kline Motor Car Company, district manager for Pennsylvania and Maryland, with headquarters at York, Penn.

S. A. E. SUMMER MEETING.

Semi-Annual Gathering at Hotel Cape May, Cape May, N. J., June 23-26.

The semi-annual meeting of the Society of Automobile Engineers will take place at the Hotel Cape May, Cape May, N. J., June 23-26, and the statement is made by the committee of arrangements that there is reason to believe that the attendance will be the largest in the history of the organization, despite the fact that the presence of the members of the British Institution of Automobile Engineers attracted a very large number to participation in the meeting at Detroit and the excursion on the Great Lakes last summer.

The membership of the association has considerably increased during the past year, the roll now exceeding 1800, and reservations made justify the belief that the hotel will be well filled. Besides numerous parties from the different sections of the country, a considerable number will drive over the road, especially from New England, New York, New Jersey, Pennsylvania, Maryland, Delaware and Virginia, and as the season will at that time be ideal for motoring, this method of travel will be preferred to the trains or steamers when time will permit. Those who have new cars have been urged to drive, if possible, for the purpose of giving the members the opportunity of examination, and there is reason to believe a number of new types and models will be shown for the first time.

The members are expected to arrive by noon June 23, for the first business to be taken up will be the meeting of the standards committee at 2, and in the evening at 8 the boards of governors of the different sections will meet.

The first business session of the society will take place June 24 at 2 in the afternoon, at which time President Henry M. Leland of Detroit, Mich., will make his address, and following this will be the report of the treasurer. Then will follow the report of the tellers on the election of members, discussion of the proposed constitutional amendment and the presentation and consideration of new business. The professional session will be opened by the report of Chairman David L. Gallup of the research division, the report of Chairman Henry Souther of the iron and steel division and the report of the miscellaneous division by Chairman John G. Utz. Discussion of these reports will conclude the afternoon's meeting.

The second professional session will take place the morning of June 25 at 9:30, at which time the business will include the report of the pleasure car wheels division by Chairman Henry Souther, a paper on the "Tolerance Specified in Connection with the British Standards of Rims for Pneumatic Tires" by F. R. Hall; a paper on the "Possibility and Difficulties of Formulating Acceptable Recommendations for One

Standard Felloe Band for Wheels to Be Equipped with Pneumatic Tires" by C. C. Carlton; "A General Summary of the Truck Tire Situation" by J. E. Hale; report of the springs division by Chairman Harold L. Pope; paper on "Ignition and Starting Devices" by A. D. Libby; paper on "Electric Transmission for Motor Cars" by J. H. Entz.

In the afternoon, beginning at 2, the delegates will discuss "The Ideal Car", which will be opened with a short paper by C. E. Davis, and which will be followed by papers and discussion of the same subject. Following this will be a paper on "Possible Weight Reduction of Cars" by A. P. Brush; a paper on "Necessary Elements of Design for a Successful High Speed Motor" by D. McCall White; a paper on "Motor Capacity for Motor Vehicles" by C. T. Myers; report of the electrical equipment division by Chairman A. L. Riker; report of the electric vehicle division by Chairman A. J. Slade; report of the broaches division by Chairman C. W. Spicer.

The closing professional session will take place at 9:30 the morning of June 26, and will be opened by a paper on "Tap Drill Sizes and Causes of Stripped Threads" by H. E. Harris; report of the motor testing division by Chairman J. O. Heinze; report of the ball and roller bearings division by Chairman Howard Marmon; a paper on "A Proper Basis for Road Vehicle Taxation" by C. O. Egerton and S. J. Fekete; a paper on "Proper Characteristics for Automobile Engine Oils" by Prof. David L. Gallup.

The social features of the meeting will include an entertainment Wednesday evening by the "players" of the sections, for which a rare programme is promised, while Thursday afternoon Emperor High-Jinks will assume command and will direct his subjects through F. E. Moskovics as prime minister, and Thursday evening there will be the usual banquet, which will be followed by an illustrated lecture describing the principal features of the second European visit of the society, Oct. 9-Nov. 22, by Orrel A. Parker. Friday afternoon there will be ball games between teams representing the sections and varying games and competitions, which will be continued the following day by those who desire to remain. During the meeting Senor and Senora don Carlos Jamie de Mor-teo, late of Argentina, have been engaged for the purpose of standardizing the tango, and those who desire will have the benefit of their tuition. The instructors are stated to have expert knowledge of the graces of Argentine tangoing, and are regarded as being the finest exponents of the art ever imported.

Roland Cole has been made manager of the Ferro Foundry & Machine Company, Cleveland, O. He was formerly with the Yawman & Erbe Manufacturing Company, Rochester, N. Y.

The Stewart-Warner Speedometer Corporation, Chicago, Ill., has appointed W. C. Knight as its western manager of sales.

PROMOTING ELECTRIC CAR USE.

A display of pleasure cars was made from May 15 to May 30 at the showrooms of the New York Edison Company, Irving Place and 15th street, by the New York Electric Vehicle Association, and May 28 a reception was arranged for several hundred people who had been invited to visit the exhibition the afternoon of that day. The visitors were received by members of the Ladies' Auxiliary of the association, the receiving party including Mrs. Louis R. de Cravioto, Mrs. C. Y. Kenworthy, Mrs. S. W. Memefee, Mrs. Norman Moses, Mrs. Walter Neumuller, Mrs. George F. Parker, Mrs. Nathaniel Platt, Mrs. W. C. Poertner, Mrs. Harvey Robinson, Mrs. Frank W. Smith and Mrs. Charles A. Ward. Music and light refreshments were provided. In the evening a private view of the motion picture "Selling an Electric Truck", was enjoyed, the scenario of which was designed by a member of the Electric Vehicle Association of America, and in which a number of prominent members of the association took part. The picture was staged and directed by the Edison Moving Picture Studios.

WILL BUILD REEDSBURG TRUCK.

The Reedsburg Motor Truck Company, Reedsburg, Wis., which is composed of E. M. McNab, E. E. Montgomery, Edward Thom, J. Seamans and others, has capital of \$100,000, and will engage in a conservative production of a truck that will be known as the Reedsburg. It will be a continuance of the type of machine built by the Piggins Motor Truck Company, Racine, Wis., driven by shaft and a countershaft and internal gears, with construction that will fit it for use on heavy grades and rough roads.

FACTORY SERVICE STATIONS.

The Willys-Overland Company has acquired the entire stock of the R. & L. Company, New York City, and has assumed control of the latter concern's three New York City service stations and one station at Newark, N. J., which it will operate in future. John T. Ranier and Paul Lineberger, who formerly controlled the company, have organized a partnership and will distribute Garford trucks and Willys Utility delivery wagons for New England, New Jersey and eastern New York State. They will continue the office and salesroom at 1880 Broadway. E. A. Williams, formerly identified with the Gramm Motor Truck Company, has been made president of the R. & L. Company, which will operate service stations as a part of its factory organization.

TRUCK HAULED 60 TONS.**Used as Tractor It Transported a Heavy Bank Vault Door in New York City.**

A remarkable demonstration of the efficiency of a truck used as a tractor was made in New York City when a machine weighing five tons and carrying a load of six tons hauled a trailer weighing nine tons loaded with a bank vault door vestibule weighing 40 tons, the entire weight moved by the vehicle being 60 tons, or 55 tons more than the actual weight of the tractor.

It is well enough known that much more power will be required to start a given vehicle load from anchorage than will be necessary after movement has been begun, and for this reason the initial tractive effort is always made slowly to minimize the stresses upon the driving mechanism, and starting on a grade necessitates the use of very much more power, dependent entirely upon the degree of gradient.

The Bethlehem Steel Company built a vault for the National Park Bank, which was installed in the building at Broadway and Anne street, New York City, and the metal was shipped from the works at Bethlehem and was brought to the foot of Wall street, at the East river, by water. It was necessary to haul it to the bank building. The frame was loaded on a wagon by a crane. The haul was made a Saturday afternoon because the streets were clear of traffic. The purpose was to use a new American-La France gasoline-hydraulic truck as a tractor, but because of an accident a machine that had been used for demonstrations for about eight years was substituted, this being weighted to insure traction.

A five-ton Sampson truck was in readiness to swing the pole of the wagon carrying the load, but when the Hydraulic truck was started the wagon was not moved from the fact that it was on a grade and the wheels had settled into the paving, although boiler plate had been placed between the wheels and the paving. The two trucks were hitched tandem and together they started the wagon and moved it at a seven-mile-an-hour pace along the water front and up a 3.5 per cent. grade in Fulton street. About midway



Hydraulic and Sampson Five-Ton Trucks Hauling a 40-Ton Bank Vault Door Frame on a Nine-Ton Wagon in New York City.

of the ascent of Fulton street the trucks were stopped because it was believed by one of the foremen that the rear wheel journals of the Hydraulic truck would not endure at the speed. Another start was made and the haul was continued at a pace of about three miles an hour until Anne street was reached, when in making a turn the machines were stopped because of a team obstructing them. Here the wheels of the wagon sank so deeply into the asphalt that it could not be moved until the wheels were jacked and boiler plate placed beneath them. This work was necessary within 100 yards of the bank building because the paving could not sustain the momentary strain upon it.

The Bethlehem Steel Company has purchased a five-ton Hydraulic truck for tractor work at an iron mine in Chile, S. A., where machinery to be installed must be hauled from the coast, a distance of 12 miles. The haul must be up a three per cent. grade, and as the parts weigh from eight to 15 tons trailers must be used. The truck is to be utilized primarily for this haulage and later on it will be given over to regular freighting between the mine and the terminal.

A few days after the vault door was hauled a similar truck hauled a trailer carrying steel girders weighing 30 tons at Long Island City, making two trips of four miles each, and climbing a grade of about 3.5 per cent. on the viaduct. Because of the lack of brakes on the trailer 10 horses were used with the trailer, two of which guided the pole and practically steered it, while eight were paraded behind it to hold the trailer on the grades. In both trips the truck was well within its capacity and could probably have hauled twice the weight of either girder.

BEIJER HYDRAULIC TRUCK.

The Beijer Hydraulic Transmission Company, Stevens Point, Wis., is to begin the manufacture of motor trucks designed by Arthur A. Beijer, and will use the hydraulic power transmission invented by Mr. Beijer. The officers of the company are: President, N. A. Week; vice president, James Mainland; secretary and treasurer, C. S. Orthman, and superintendent and general manager, A. A. Beijer.

The Kerosene Power Company, Minneapolis, Minn., is negotiating with the Commercial Club of Beaver Dam, Wis., for the location of its plant in that place, which is conditional upon investment by Beaver Dam citizens in the company. The company produces kerosene engines and is now perfecting one that is intended for use in different forms of freight carrying vehicles.

The New York City ordinance that prohibits the opening or maintenance of a garage within 50 feet of a public school has been declared valid by the New York court of appeals.

PALMER-MOORE TRUCK BODIES.

The Palmer-Moore Company, Syracuse, N. Y., is distributing some very interesting literature, which shows the four body styles that are built as standard equipment, these including the open express type, the platform stake body, the four-post express body that has a roof supported by four stanchions and side and end curtains, this being furnished with screen sides and gates when desired, and the full panel body. The last mentioned style is built with the roof extending over the dash, fully protecting the driver, and the loading is done at the rear, full doors that may be locked insuring against damage from storm and loss from theft. When desired the company furnishes bodies to meet the special requirements of the purchasers.

MASSACHUSETTS NEW LIGHT LAW.

Beginning July 1 the new Massachusetts law that requires all road vehicles to be lighted at night will become operative. The statute specifies that a light shall be so displayed on all highway vehicles that it shall be visible from the front and rear from an hour after sunset until an hour before sunrise, and differs from the statute of 1911 only in that the provision exempting vehicle operating where street lights are maintained 500 feet or less apart has been eliminated. Push carts and vehicles used for hay, straw, wood, lumber or other inflammable or heavy freights are not required to carry a lamp.

GOODYEAR BLOCK TIRE PRICES.

A reduction of approximately five per cent. has been made in the prices for the block form of truck tires manufactured by the Goodyear Tire & Rubber Company, which makes the cost of these tires about the same as is charged for the tires of the band form. The statement is made that the increased facilities and the greater production of block tires justifies the company in establishing the new prices. The demand for block shoes has steadily increased.

HOOD RUBBER COMPANY'S BIG GAIN.

The Hood Rubber Company, Watertown, Mass., during 1913, increased its assets from \$5,526,530 to \$6,273,478, a gain of \$746,948, and during the same period increased its surplus from \$2,061,530 to \$2,083,478. This company manufactures a great variety of rubber products, but it is specializing the production of a motor truck tire.

William Besserlich, who designed the truck built at Clintonville, Wis., by the Four Wheel Drive Auto Company, has retired from the concern and is now engaged in developing a new machine, driven by four wheels, with power applied direct, which may be built on the Pacific Coast.

OFFER \$1,800,000 FOR POPE COMPANY.

At Hartford, Conn., June 12, Col. George Pope, receiver for the Pope Manufacturing Company, made a report to Judge William L. Bennett of the Connecticut superior court, and asked that he be continued three months beyond June 22 as receiver, and at the same time a proposition was made by eastern banking interests to pay \$1,800,000 for the property of the company. Col. Pope recommended that the offer be accepted, in which recommendation most of the creditors joined. The court authorized Col. Pope to continue operating the factory to finish the cars for which material is on hand, and the plans for taking over the properties of the company at Hartford and Westfield, Mass., will be completed. This offer will undoubtedly be accepted and this will insure the continuance of the company and the production of bicycles, motorcycles, pleasure cars and trucks.

RECEIVERS TO PROTECT BUSINESS.

Charles P. Blinn, vice president of the National Union Bank of Boston, and Renton Whidden of Brookline, Mass., were on June 8 appointed receivers of the Randall-Faichney Company, with factories at Boston, Mass., and Watertown, N. Y., to carry on the business, upon a petition presented to the United States district court that represented that the company's assets and property were being wasted through mismanagement and lack of co-operation between the officers and directors, and lack of sufficient capital. The company is represented as solvent, with assets largely in excess of the obligations. No opposition to the proceedings was presented by the company.

STUDYING DOCK PROBLEMS.

The May meeting of the Motor Truck Club of America, at its New York City headquarters, was given over to discussion of the trucking problems met with at the docks of the water freight carrying lines. The speakers included Dock Commissioner R. A. C. Smith, President J. K. Orr of the New York Team Owners' Association, and Willard B. Britton, the latter delivering a talk on freight handling at docks in America and Europe. His remarks were illustrated by stereopticon views of different conditions and facilities, these having been obtained during his observations in a number of the most important ports.

A decidedly interesting and harmonious understanding of what the club purposes was reached, and in the work it is now engaged in Commissioner Smith stated his willingness to appoint a committee to confer with another committee representing the club, this joint body to consider plans that might bring about desirable improvements. He personally was willing to do all that he could to further any plan that might promise to benefit the business men of the city.

Vice President J. B. Gardiner of the New Eng-

land Steamship Company, which operates the Fall River line of Sound steamers, sent a letter through J. E. Owsley, which stated that his company was carefully considering the conditions at its piers with a view of making all the improvement that was practical. The letter follows:

The question of terminal conditions and improvements thereto is one to which the New England Steamship Company is giving much and careful consideration.

It has made a decided change in the method of handling its freight, and the location for receiving its outbound freight. The electric freight truck has been installed to handle all its outbound freight and such of its inbound freight as is economical and the matter of time will allow * * * afforded the shippers and the economy in handling has proved the wisdom of the change.

Formerly there was a mixture of loaded and empty wagons entering and leaving the pier. One had to wait for the other, due to the fact that, with the handling of outbound freight with the hand truck, it was necessary to receive this freight as near to the freight gangways of the ships as possible to obtain the most economical hand trucking distance.

Now all freight is received at a receiving platform at the bulkhead. No teams loaded with freight use the pier, which is entirely for the use of people looking for inbound freight. This elimination of loaded teams from the pier has taken away 900 teams a day from the pier.

Under the old arrangement the teamster with one or two light shipments had to wait as long to get his freight to the receiving place 500 feet down the pier as the man with a full load. It is now a regular occurrence to see such a teamster draw up his wagon within 75 feet of the receiving platform and tote over his several packages and get away within a very few minutes.

There are a great many small details in connection with this installation that will strike a pier manager as useful and beneficial, but are too numerous and somewhat trivial to take up your time. It will, however, give me great pleasure to go over the matter individually at any time or to have any one of you visit the pier at any time.

The manager of the Commerce Motor Car Company, Oakland, Cal., is C. C. Evans, formerly of Seattle, Wash.

With capital of \$25,000 the Dallas Motor 'Bus Company has been organized at Dallas, Tex., and will shortly inaugurate a public service in that city.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., OF THE MOTOR TRUCK.

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(Signed) WM. H. BLACK, Member of Firm.

Sworn to and subscribed before me this sixth day of April, 1914.

(Signed) THOS. P. CORCORAN, Notary Public.

(SEAL)

(My commission expires July 3, 1914.)

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FOR SALE—Four four-ton Benz Gaggenau and two three-ton Kelly air-cooled truck chassis. Can be seen any time. Call or address, J. D. Beaton, 316 E. 46th street, New York.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., JULY, 1914

No. 7

MOTOR APPARATUS AT SALEM FIRE.

Relief Companies Save Valuable Time by Rushing Long Distances Over the Roads, and the Machines, Thoroughly Tried in the Hardest Actual Service Test Ever Known, Demonstrated Remarkable Efficiency.

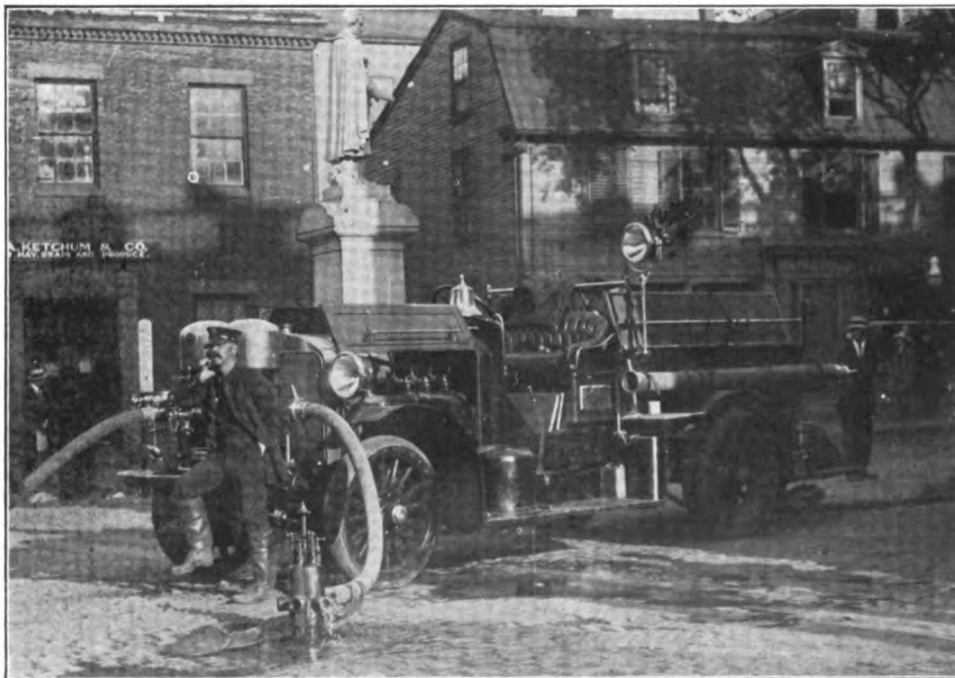
MOTOR fire apparatus was given the 33rd degree test June 25-26, when the appeals for assistance from the chief of the department of flame-swept Salem, Mass., brought into that city the greatest number of fire apparatuses ever in use at any one time in New England, and possibly in America. The conflagration was without parallel, because of the conditions that contributed to its spread, and which could not have been more successfully combined to cause disaster. In few instances in this country was the loss greater, or the number of sufferers more than resulted from the Salem calamity.

Careful estimate shows that 253 acres of the city, closely built with dwellings, shops, factories,

mills and varying types of structures were devastated, the destruction being generally complete, even the ashes being carried away by the drafts of air caused by the enormous area of burning buildings. Those who have not observed the flame-baked earth and the hundreds of basement walls or chimneys that are monuments of valuable property that was obliterated in a

brief space of time, cannot conceive the magnitude of the fire that the firemen fought so bravely, nor have any realization of the struggle that was waged by those who were summoned to aid a stricken people.

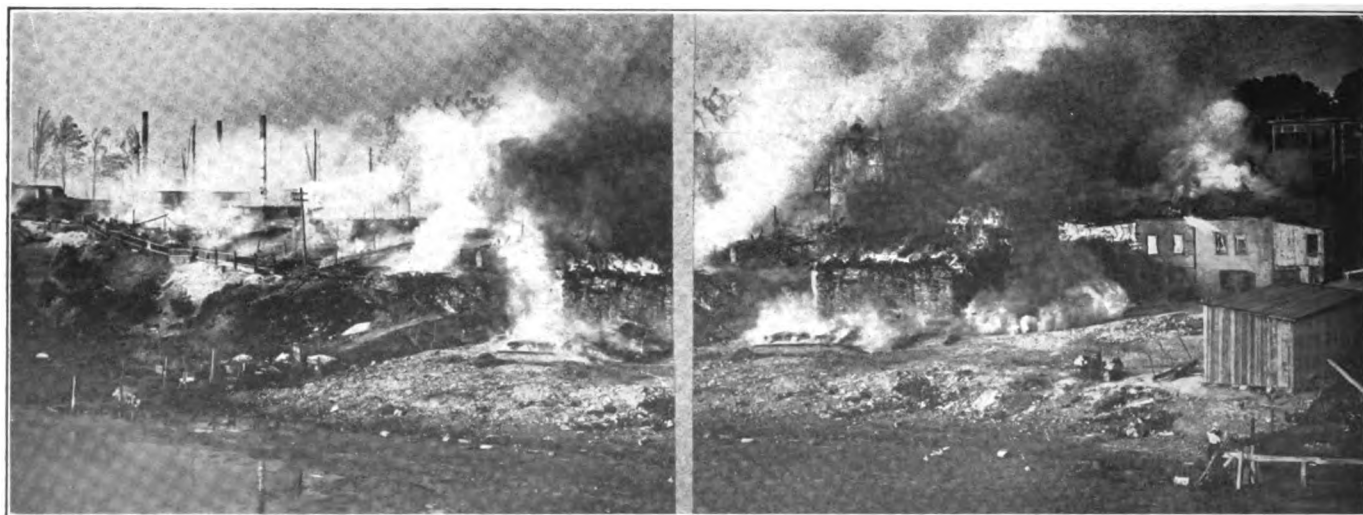
The conflagration was spectacular and terrifying in the rapidity of its spread, and, fanned by a strong wind, as well as by the draft created by the upward movement of the atmosphere caused by the flames, it developed a forward movement that could not be faced. While the purpose is to deal with motor apparatus and its use at the fire, for there is no question that the mobility of the pumps and combination equipment saved valuable time and really resulted in the saving of the city from destruction, for



The Ahrens-Fox Motor Pump (Engine No. 2) of the Lynn Fire Department, That Was Worked 17 Hours and 30 Minutes Continuously.

the better understanding of the conditions that were met with it is necessary to describe some of them briefly.

Salem is a city of nearly 50,000 people, situated on the water front, and on a long peninsular between the arms of the sea. The city has developed westward and it is surrounded by Marblehead, Lynn, Pea-



Two Scenes of the Fire at Its Height: The Flames Raging at the Water's Edge and No Possibility of Utilizing the Water Because the Firemen Were Cut Off from It.

body, Danvers, and, across the inlet at the north side of the city is Beverly, the cities and towns being named in order from east, south, west to north. The inlet between Beverly and Salem is spanned by the Boston & Maine railroad bridges and the regular highway bridge, so that there is direct communication between the two either by train or by road.

The Boston & Maine railroad runs through the city nearly north and south. The older part of the city is east of the railroad, and was given over largely to manufacturing establishments and tenements. The main or principal thoroughfare of the city is Essex street, which is generally north and south. West of the railroad and approximately a mile distant is an eminence known as Gallows Hill, and one of the main approaches into the city from the west, from Danvers, is through Boston street, which curves in many directions, resembling the traditional cowpath, until it reaches the centre of the city.

Where the Conflagration Started.

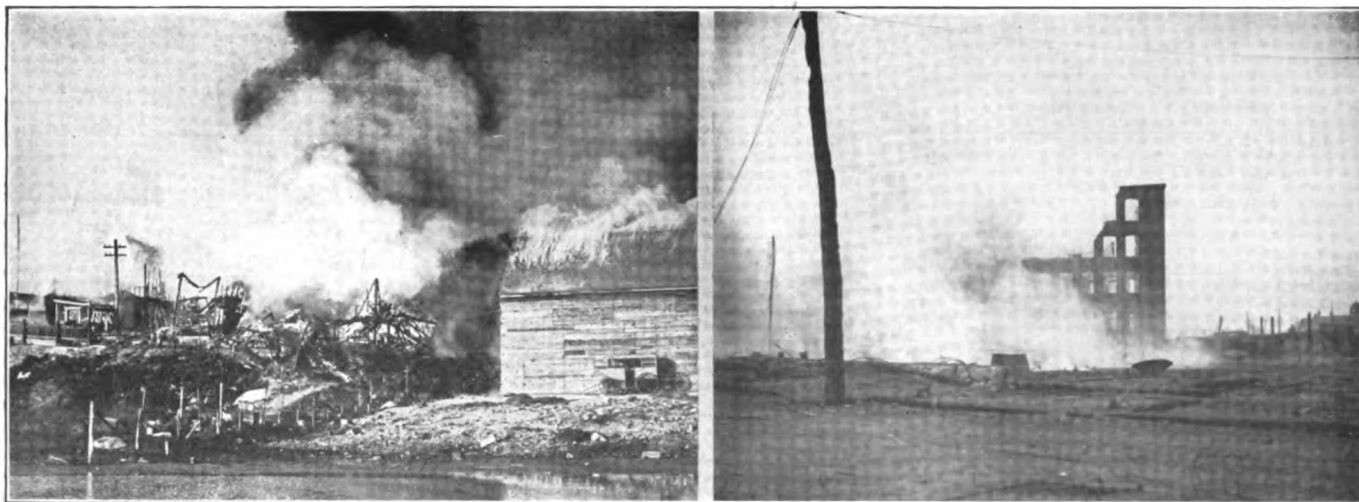
At the foot of Gallows Hill is a section known as Blubber Hollow, and here a considerable number of wooden factories had been built, some of them of con-

siderable proportions, generally devoted to the manufacture of different kinds of shoe leather, to tanning leather, and in some instances to other purposes. As a rule these buildings were saturated with oil and grease used to prepare the skins, and with rare exceptions were protected by equipment such as is regarded as necessary in modern manufactories. The entire area was built over, there being many small wooden dwellings and occasionally larger houses intended for the use of from three to six families.

Between Blubber Hollow and the Boston & Maine railroad tracks, was a continuity of dwellings, shops, factories and occasionally a public building. The streets were narrow and the structures closely built as a rule. In this entire portion of the city were comparatively few brick, stone or concrete buildings. The fire was originated in the patent leather factory of Korn & Co., and sweeping from this point it ate a path to the railroad, practically a mile, in less than an hour and a half. East of the track the fire apparently could only be stopped when it reached the water front, but there was a change of the wind that drove the flames north, in a general way paralleling the railroad, and



Panoramic View of the Flame Swept Section of Salem, Showing the Large Area of the City That Had Been Devastated—The most Incredible Rapidity, the Unusual Combination of Conditions Contrl



The Disaster at Its Height: At Left, Destruction of a Wooden Tannery and Its Barn; at Right, the Smoldering Ruins of Large Morocco Factory.

only when it reached a section made up largely of brick and stone buildings was perceptible headway made against it.

The Service of Water Supply.

The Salem water supply is drawn from Wenham Lake, six miles distant, and this is shared with Beverly on the north side of the inlet. The lake is low and the water is pumped into the mains and pressure is maintained by pumpage. The pumping station must supply the population of the two cities and during the period of the year when the greatest quantity of water is consumed the pumps are not of sufficient capacity to maintain a pressure that is required for normal demands, to say nothing of an emergency. Peabody has a separate water supply, and its main is connected with the Salem water system, but this is merely a single 16-inch pipe, and its flowage is limited.

This Peabody connection was installed in anticipation of increased demands upon the Salem system, and an exceedingly wise precaution it was, for had not the regular pumpage been augmented by this the disaster would have been much greater.

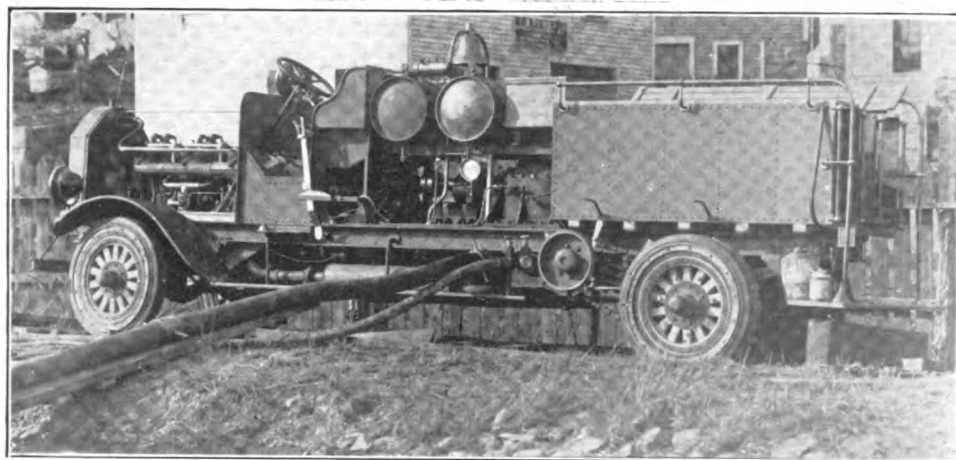
Salem has an excellent fire department, and yet

there was an error in providing for it that was extremely costly. The city water department has installed both the post and the Lowry hydrants, the last named type being placed in excavations in the streets with manholes and covers level with the paving. The hydrant is below the surface and to use it the cover must be raised and what is known as a chuck is attached to the pipe end. To this chuck the lines of hose are coupled, four being the limit for any one hydrant, and the connections are made to the chuck a few inches above the street paving. The greater number of hydrants in Salem are of this type, but in some sections the post type, with two, and in some instances three-way connections, are used.

The Lowry hydrant can only be used with the chucks, and the Salem apparatus is equipped with these and a few spares were kept at headquarters in the event of need. The Lowry hydrant chuck, and the post hydrants of the city, have connections threaded $7\frac{1}{2}$ threads to the inch. All of the city hose has coupling to fit these connections. Aside from Salem all of the city or town hydrants within a radius of 20 miles from Boston have hose connections, and the



Burned District Was Largely Wooden Dwellings and Shops and Factories, with Narrow Streets, and the Fire Spread with Alacrity to the Conflagration, Which Practically Was Unchecked for Hours.



The Mammoth Fire Pump of the Fore River Ship Building Company, Capacity 1700 Gallons a Minute, That Made a Wonderful Demonstration of Efficiency for Many Hours.

hose couplings are what is known as the Roxbury thread, seven to the inch. As a result of the difference in the thread of the hose couplings of the outside fire departments and hydrant and hydrant chuck couplings of the Salem water system, connections could not be made that would not leak, for few of the apparatus sent had spare hose gaskets, and none were equipped with reduction coupling that would have made possible tight connections of the hose. Had the lings of the Salem water system, connections could have used two gaskets to a hydrant coupling, the connections could have been made tight, but in ignorance of the facts and working in desperate haste, most of the hose leaked badly at the source of supply. This leakage was a factor of considerable importance.

No Pressure in the Mains.

But further, as the fire progressed hydrants were cut off, some of them with the water running. The water meter connections in many of the burned buildings were melted and the water flowed constantly from them in considerable volume. Hundreds of citizens sought to protect their property by the use of garden or other hose, and the combined use of hydrants by firemen as they arrived diminished the pressure in the mains so that there was but very little pressure, and, to add to the calamity, there was a break in the water main close to the Beverly bridge that very nearly cut off all water from that source until temporary repair could be made. But as a further condition, the tide was high at 11:52 a. m., and the fire started perhaps a

mile and a half from tidewater. By the time the fire had reached the water front property the tide was so low that water could not be obtained from that source, and as the sweep of the flames was toward the water, and the hydrants were necessary for the greater part of the apparatus in use, the firemen could do nothing to stay the progress of the conflagration. To undertake to make stands ahead of the flames, especially between it and the water, without certain means of retreat,

was the height of folly. When the fire had reached the section east of the railroad tracks, where there are canals that are filled at high water, the tide was low and even this source of water supply could not be drawn upon, but it was available as the tide flooded.

Fire Burned in Form of Crescent.

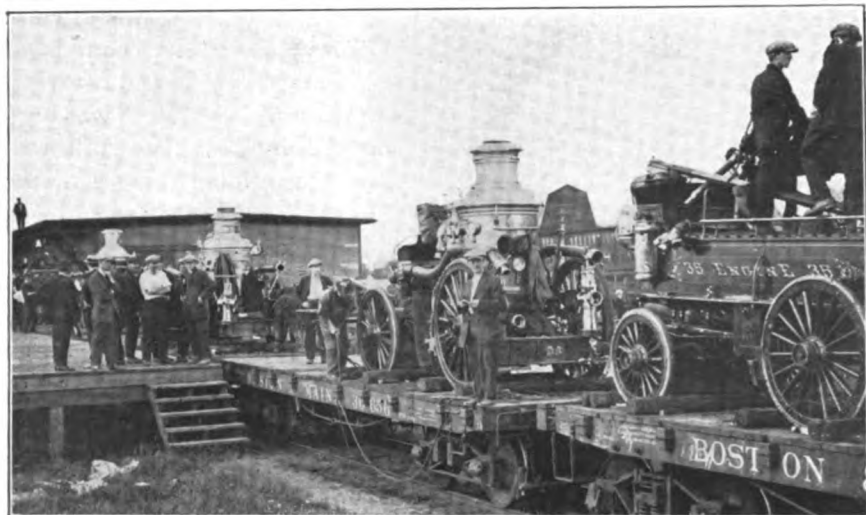
Generally speaking, the path of the conflagration was a crescent, the west tip at Blubber Hollow, and the lines spreading to the Boston & Maine railroad, and east of the tracks turning and gradually converging. From tip to tip the crescent was nearly two miles length, and at the widest part possibly a half mile width. The tremendous sweep of the flames may be judged from the fact that the first alarm was sounded at 1:40, and directly after 3 o'clock the fire had reached the railroad, fully a mile away. From this point the fire worked easterly until about 6 o'clock, and then the wind changed and drove them from the water front and through another thickly populated portion of the city.

Many Calls for Assistance.

The fire resulted from an explosion and in an incredibly brief space of time had enveloped the entire structure. By the time the firemen had reached the factory the need of additional apparatus was evident and a general alarm followed, but before the Salem apparatus had all reported requests were made of Peabody, Beverly, Marblehead and Lynn in the order named for assistance, and this was followed by a second call for assistance upon Boston, Swampscott



One Section of the Burned District of Salem the Morning After the Fire, Looking Toward the Harbor and Showing the Ruins of the Naumkeag Mills in the Distance.



The Second Section of Boston Steam Fire Pumps in the Railroad Yard Awaiting Horses and Rigging to Remove Them from the Cars.

line more than three miles length, one may imagine that the firemen could not be concentrated, and because of the loss of many hydrants and the low water pressure only the pumping engines were of real value. Towns and cities that offered assistance were informed that because of the lack of water apparatus could not be utilized, and firemen were only needed to take the places of men exhausted by hours of extremely hard work.

Firemen Driven by the Fire.

Because of the impossibility of any one man directing the work of the firemen, each incoming company worked generally under the orders of its commander, and companies were forced in

and Lynn. Next came other calls for help upon Lynn, Boston, Chelsea and Wakefield and again appeals were sent to Danvers, Reading, Everett, Winchester, Stoneham and Revere. Later on Manchester, Medford and Gloucester were called upon, and shortly after the fourth call was made upon Lynn and Malden was asked for aid. The last request was made upon Somerville. These



Removing the Boston Steam Fire Pumps from the Cars by Hand, a Work Unnecessary with Motor Apparatus.

requests for assistance were from 1:45 the afternoon, and during the period stated the firemen and apparatus was sent by train and over the road. In addition to these responses, firemen without apparatus were sent by Andover and Winthrop. The alarms sounded in the cities and towns from which help was sent attracted a great deal of interest within a radius of a score of miles, and every fireman off duty, as well as hundreds who volunteered their services, gave individual assistance.

By 10 o'clock in the evening the progress of the fire had been stopped, and practically all that could be done was to leave the ruins to smoulder and prevent additional fires. With a fire

of lack of water and inability of the men to face the intense heat. Some of the companies lost considerable hose because the spread of the flames was so rapid it could not be taken out, and many times apparatus was moved by hand, as the animals could not be taken into the smoke and heat that preceded the spreading of the



Firemen and Volunteers Hauling a Hose Wagon from the Freight Yard by Hand Because of the Inability to Procure Horses.



Removing Orphans and Their Attendants from a Burning Orphanage to a Place of Safety in a Commandeered White Passenger Omnibus.

were forced may be gained from the fact that a number of the crews with chemical and hose wagons could only replenish the tanks (that they might use the chemical streams) by draining hot water tanks in deserted and, in many instances, burning houses.

As the water pressure fell the steamers attached to the hydrants many times created vacuums in the hydrants and water mains, and where water was obtainable long lines of hose, from 750 to 1200 feet being necessary to reach the available supplies. Every fireman from another city or town realized a helplessness that was heart-breaking. They had equipment, the men, the courage, and yet were forced to witness enormous destruction because they could not get water.

Motor Apparatus Sent to Aid.

In all 52 different pieces of fire department was sent to the assistance of Salem, and of this total 29 were motor driven. Three of these were tractors that drew steam fire pumps, and in two instances steam pumps were brought into the city by motor trucks. One of these was a Manchester steamer, that was hauled 11 miles by a Packard truck owned by the Paine Furniture Company of Boston, the driver volunteering to do the job, and the Winchester steam pump came 20 miles by road behind a truck, the haul being impossible with animals, and railroad transportation would have taken hours.

An illustration of the wonderful mobility of the motor apparatus was made by the La France combination chemical and hose wagon of the Boston department sent over the road at the same time the two-horse steam pumps and two hose wagons were sent to the Boston & Maine freight yard at Charlestown to be shipped by special train. This machine made the 14½ miles in 23 min-

utes, and the crew was at work before the other equipment was started. And on arrival the horse apparatus was unloaded by hand, a work that was hazardous because of the inexperience of the volunteers, the lack of facilities, and the excitement of the workers. Not only this, time was extremely valuable and every minute's delay meant greater spread of the fire.

Motor Apparatus Aided Salem.

The different appeals for assistance brought into Salem 29 motor driven apparatuses, of which Boston, Beverly, Cambridge, Chelsea, Danvers, Everett, Lynn, Malden, Manchester, Medford, Revere, Somerville, Winchester and Stoneham sent combination hose-chemical wagons; Chelsea, Marblehead, Reading and Wakefield sent triple combination pump, hose and chemical machines; Lynn and Swampscott sent motor pumps; Lynn a Federal hose wagon; and Lynn, Somerville and Beverly sent tractor drawn steam fire pumps; Lynn sent a tractor drawn ladder truck, as well as two chief's cars. Salem had one combination hose and chemical wagon.

The steam fire pumps were, aside from the five from Boston and the two from Gloucester, sent over the road, two coming from Peabody, and one each from Malden, Manchester, Marblehead and Winchester. A Medford steamer was sent to Malden to be shipped by train, but was held at the freight yard because of advice that it could not be used from the scarcity of water.

The Makes of Motor Equipment.

Of the apparatus of the motor driven type at the fire eight were American-LaFrance make, eight were



Salem Homes and Business Property Disappearing in a Sea of Flame, as Seen from Across the Tracks of the Boston & Maine Railroad.



A Coal Yard and Surrounding Property a Furnace of Such Proportions That It Could Not Be Attacked—A Typical Illustration of the Destructiveness of the Flames.

second call was responded to, with a crew of four. The Knox-Martin tractor, with the ladder truck, made the same run in 14 minutes with 14 men, and the American & British gasoline-electric tractor, with a steam fire pump, made the distance and the men were at work in 14 minutes, these being examples of the possibilities of tractor-drawn heavy apparatus. These machines made an average of 19.1 miles an hour through city streets and roads that were being traversed by hundreds of motor vehicles, for thousands of people journeyed to Salem by cars to witness the battle of the firemen.

The distance called for driving work far in excess of what fire apparatus is usually required in suburban service. The machines were delayed by trains at crossings, by the

Knox, two were Seagrave, two were American & British, one a Robinson, one a Webb, one an Ahrens-Fox, one a Fore River Ship Building Company, one a Federal, one a Christie, one a Knox-Martin, one a Chalmers and one a Pope-Hartford.

The reports of the commanders of the different detachments show that some of the work was quite beyond what any machine might be expected to endure in service, and yet without exception the engines demonstrated capacity that would convince any man of their efficiency and endurance.

The Speed of the Machines.

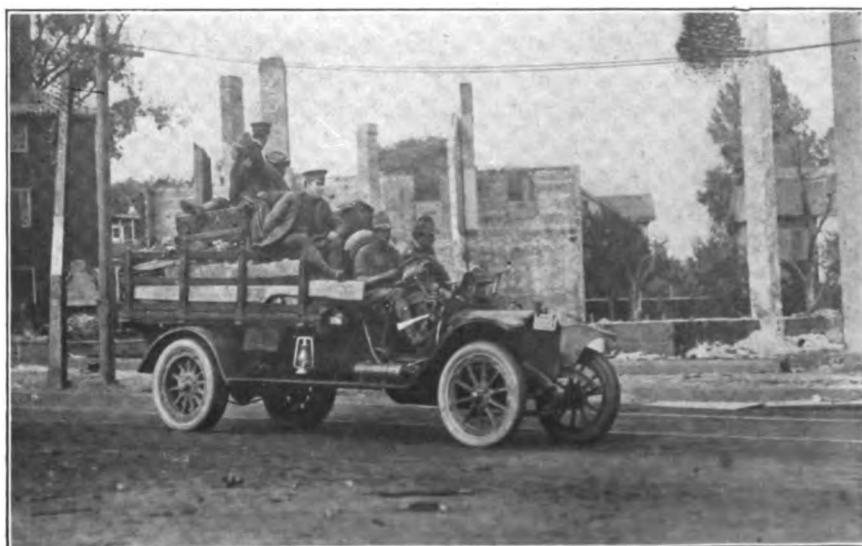
Considering the speed of the machines: The Cambridge department was asked for assistance the morning after the fire, and a Knox combination wagon was sent over the road, 23 miles, in 46 minutes, this being at the rate of 30 miles an hour through all kinds of traffic and carrying 19 men.

When the Lynn department received the first call for aid at 1:55 an Ahrens-Fox pumping engine was started in one minute, and this machine covered four and a half miles in 12 minutes, carrying 12 men. The Seagrave combination wagon made the distance in nine minutes when the

unfamiliarity of the drivers with the roads, but fast time was made. The mileages of the relief equipment sent by road was as follows: Boston, 14.8; Cambridge, 23; Chelsea, 15; Danvers, 4; Gloucester, 15; Lynn, 4.5; Everett, 14.2; Malden, 14; Manchester, 11; Marblehead, 4.5; Medford, 18; Peabody, 2; Reading, 13; Revere, 12; Somerville, 19.5; Stoneham, 12; Swampscott, 6; Wake-



The Knox Triple Combination Apparatus, Sent to Salem From Reading, That Worked 10 Hours and 30 Minutes, Making Three Changes of Location.



Militia Squad Using a Commandeered White Truck for the Distribution of Supplies to the Homeless Salem Citizens.

field 12, and Winchester, 20.

The powerful motor combination hose and chemical wagons made surprising time in the runs, averaging in some instances more than 30 miles an hour through roads filled with traffic. The LaFrance machine from Everett did the 14.2 miles in 23 minutes. The speed of the tractors was indeed surprising, and the results showed conclusively that converted horse apparatus can have the power and mobility of the full motor equipment by the utilization of the tractors.

The Christie tractor from Somerville broke a thrust bearing and was towed into Salem by a truck, and then the steam pump was worked for eight hours steadily. The long run, 19.5 miles, was an unusual test, and despite an auxiliary water tank the machine heated the water in the radiator to such an extent that renewal of water was necessary twice, and the escaping steam and hot water was blown back over the machine, so that the crew was forced to stop and cool the water to protect themselves.

Hard Work for Long Hours.

The time of service of the machines varied greatly because of frequent changes. To illustrate, the Marblehead engine was coupled to three different hydrants before water could be obtained, and while the crew worked 15 hours and 15 minutes, not all of the time was the machine pumping. Nine changes in all were made by this squad. The Peabody men, with steam pumps, were worked for 20 hours and five minutes, and the Lynn crew, with the Ahrens-Fox engine, for 19 hours and 36 minutes, this machine pumping continuously for 17 hours and 30 minutes. During that time the engine used 55 gallons of gasoline and three gallons of oil.

The La France engine from Swampscott made the run to Salem, 6.1 miles, in nine minutes and 45 seconds, and started with four lines of hose, but after vainly working for a half hour, during which time the compound gauge showed 20 inches of vacuum because of the lack of water in the main, changed to another location, where it worked two lines of hose nine hours and 15 minutes, having abundance of water. A change was then made and the pump worked four hours and 21 minutes with one line, and the fourth shift was for a single line for one hour and 25 minutes. The total pumpage for this machine was 15 hours and 31 minutes and the engine was run continuously for 17 hours and 21 minutes. Before the start for Salem the motor was run two hours and six minutes at three different fires.

The Robinson pump of the Chelsea department was in service 10 hours and 30 minutes and was compelled to make six changes, losing 500 feet of hose to save the engine from being trapped by the fire. Several times the engine could draw only enough water for a single line of hose. The Seagrave combination wagon was changed three times. The Knox combination wagon of the Danvers department was in service 13 hours, and during that time made seven changes of location.

The Knox combination wagon from Manchester made the 11 miles in 16 minutes, carrying a big crew of men, and the company was on duty for 12 hours, making six changes during that period. The Knox triple combination engine from Reading was nearly an hour finding water, and then located a stagnant pool and drafted through 20 feet of suction hose and forced it 1000 feet for five and a half hours. Later the company was located at a hydrant and laid two lines of 1000 feet each, and pumped steadily for five hours. This machine used 40 gallons of gasoline and six quarts of oil.

A remarkable service was that of the giant pump of the Fore River Ship Building Company. This is the largest fire pump ever built and has a capacity of 1800 gallons a minute. The machine has a six-cylinder motor of 150 horsepower at maximum capacity, and a speed of 40 miles an hour. It had been sent to Manchester, N. H., and had been worked continuously from 2 to 11 the morning of June 25 at a fire in that city. The crew was returning to Quincy, Mass., and was at Stoneham when the call for assistance was received by the Stoneham crew. The big machine was rushed over to Salem and there it was worked for 17 hours and 30 minutes, supplying water for the crews of the combination wagons from Medford, Revere and Stoneham, and for other apparatus. This pump at one time had eight lines of hose coupled and with that supplied satisfactory streams to all. Being merely a demonstrating crew and not attached to a department, no special record of the service appears in any report, other than the praise that was given by the commanders who worked their men from it.

The analyses of the work of the different motor apparatuses at the Salem fire show conclusively that the machines have been developed to a point where they are not only as dependable as steam apparatus, but they have other qualities that are immeasurably superior to any other form of fire equipment that has been produced.

VERGES PNEUMATIC CLUTCH.

A pneumatic clutch, designed by Henry A. Verges and patented, which is claimed to have decided advantages, is now being produced by the Verges Manufacturing Company, Milwaukee, Wis. The clutching member is a leather-faced cone, but it is controlled by an air cock located on the steering wheel. Exhausting the air chamber engages the clutch and filling the air chamber disengages it. The statement is made that the clutch is adapted for all kinds of vehicles, that it is fool proof, and that it will never engage harshly.

The Buffalo Electric Vehicle Company, Buffalo N. Y., has appointed as director of sales and publicity W. A. Zimmerman, who was associated with the Mercury Manufacturing Company, Chicago, Ill., as secretary and general manager.

POPE PLANT NOT SOLD.**Court Orders Disposal of Hartford and Westfield Plants Separately.**

The offer of a syndicate of \$1,800,000 for the property of the Pope Manufacturing Company having been refused by order of Judge Bennett of the Superior Court at Hartford, Conn., a petition was presented in behalf of a committee of creditors asking that the plants at Hartford and Westfield be sold in Massachusetts at auction sale. This was considered by Judge Bennett July 7, and refused, the court advising that a second application be filed asking for the disposal of the property separately.

There is reason to believe that the suggestion of the court will be followed by the creditors' committee, and the stockholders may join in the petition. Judge Bennett filed a memorandum in which is noted that from the evidence given the Westfield plant, which builds bicycles and motorcycles, is highly profitable, while the losses have been on the Hartford property, and the business conducted by each is separate and distinct. The court found:

"The evidence shows that the Massachusetts plant is worth and ought to bring \$1,250,000, and having heard the evidence I am of the opinion that the Connecticut property is worth and may fairly be expected to sell for more than \$550,000. If this petition should be granted it would seem that the Connecticut property would be sacrificed in order to obtain the Massachusetts property".

The court was further of the opinion that if the plants were sold as it suggested there might be some money realized that would be distributed among the preferred stockholders.

The offer of the syndicate was for the payment of \$400,000 cash and the issuance of notes for \$1,400,000, payable in five years, the cash to be immediately available for distribution, but this was objected to by the creditors on the grounds that they would have to wait for a long time for payment of their claims. There was also remonstrance by some of the stockholders on the ground that they were not in any way considered. Receiver George Pope stated that the offer was the only one received, and that unless some disposition was made of the property after the completion of the machines in process of manufacture at the Hartford plant, he would have to discontinue production, and the business could not be sold as a going concern.

Obviously, the greatest value would be in an operating property, and with a view of realizing the most from the receivership he was desirous of some action that would make possible the disposition of the plant before it was closed. Testimony was offered as to wrecking values, etc., and the statements of representatives of the syndicate were made. Judge Bennett regarded the offer of the syndicate as speculation, and declined to sanction its acceptance. Then came the petition of the creditors.

VEHICLE LIGHT LAWS.**Requirements of New Statutes of Rhode Island and New Hampshire.**

July 1 new statutes became effective in Rhode Island and New Hampshire that require all animal vehicles using the highways at night to carry lights, with certain exemptions. While these do not conflict with the laws regulating the operation of motor vehicles, they are of importance to motor truck owners, for in the event of accident of any kind in which an animal vehicle is involved, compliance with the statutes is necessary for owners of horse conveyances to establish their rights upon the highway.

The Rhode Island law provides that every vehicle when located or operated on any public highway or bridge shall display one or more lights, so placed as to be visible both from the front and the rear, from one hour after sunset to one hour before sunrise, provided that such vehicles shall not be transporting as the principal freight any commodity that might readily catch fire from the light used. The penalty for violating the law is a fine of not exceeding \$20 for each offense, and a fine of \$5 and costs may be imposed upon any person who refuses to give his or her correct name and address when requested to do so by a properly authorized policeman or constable.

The New Hampshire law provides that every vehicle, whether stationary or in motion, on any public highway or bridge, shall have attached to it a light or lights so placed as to be visible from the front and rear, from an hour after sunset to an hour before sunrise, but exempts vehicles designed for the transportation of hay, straw, wood, lumber, stone, machinery or other heavy freight, and shall not apply where street lights are maintained at a distance of 500 feet or less apart. The exemptions, however, must be made by the boards of selectmen of towns, and be made in writing and for stated periods, and such authorization must be produced by a defendant in the event of any prosecution. The driver or custodian of a vehicle is the person liable for the penalty for violation. Any driver of an unlighted vehicle must give his correct name and address when requested by a policeman or constable. The penalty for a violation of any section of the law is a fine not exceeding \$5.

The Massachusetts law also provides for the lighting of all animal vehicles from an hour after sunset to an hour before sunrise, with exemption of those carrying inflammable loads.

E. M. Raynoer, J. F. A. Comstedt and C. Presbrey of New York City have incorporated the Atlas Automobile Jack Corporation with capital of \$25,000.

The Lippard-Stewart Motor Car Company, Buffalo, N. Y., has appointed John T. McDonough, Jr., of Atlanta, Ga., a southern district representative.

THE DEKALB 3000 POUND TRUCK.

A 3000-pound freight vehicle chassis has been developed by the DeKalb Wagon Company, DeKalb, Ill., and after a long period of testing and observation has been approved and is now offered in the market. The DeKalb Wagon Company has built many types of horse vehicles for years and has had widespread experience with the haulage requirements of the public. The company several years ago determined to produce motor wagons, and with this purpose instituted a series of trials and tests to determine what types and capacities would be the most satisfactory as a commercial product.

After careful investigation of the requirements of the largest number of business men the company's engineers recommended the size that is now built, and the design was developed with the purpose of securing every desirable quality that experience and forethought could suggest, these including large factors of safety throughout, accessibility and simplicity, and incorporating whatever had been established by standard practise to be desirable.

The DeKalb chassis is built comparatively low to minimize the height of the centre of gravity with average loads and to have the deck of the machine convenient for loading. Another object was to have sufficient road clearance and suspend the power plant so that the drive would be practically a straight line, conserving the power and better distributing the driving stresses. The machine as a whole shows careful designing and the combination of wholesome details that will undoubtedly appeal to the experienced mechanic.

The chassis includes several components that are built by specialists, among them being Continental motors, Covert gearsets and Ross steering gears, but the design shows an arrangement that is intended to obtain extremely satisfactory results. The engineers of the company maintain that the use of such standard components as are incorporated in the chassis means that the purchaser is not only assured of the standard products of the largest and best known manufacturers of the industry, but has at his command the service re-

sources of every concern that produces these components, as well as those of the DeKalb company.

Motor a Continental.

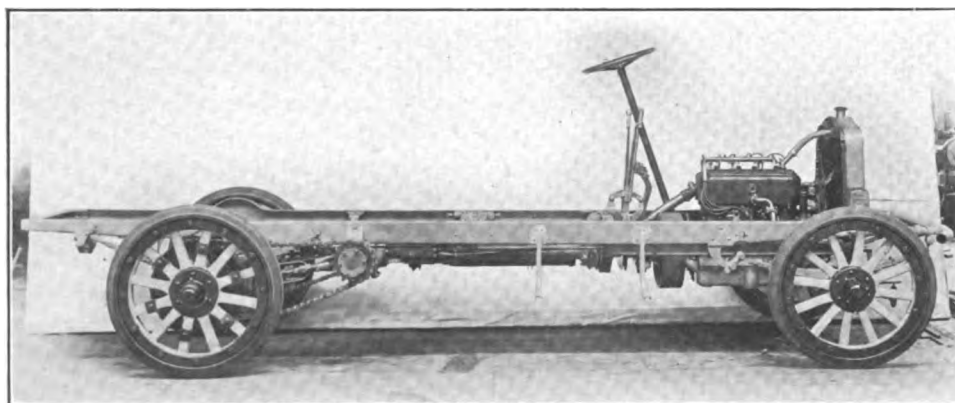
The Continental motor used is a vertical four-cylinder, four-cycle, water-cooled, L-head type, with cylinder bore of $4\frac{1}{8}$ inches and stroke of $5\frac{1}{4}$ inches, the cylinders being cast en bloc. The water jacket head is cast separately. The cylinders and pistons are carefully machined, the latter being fitted with four eccentric split rings. The crankcase is an aluminum alloy and is in two sections, the upper half carrying the three main bearings and the lower forming the crankcase base and the oil reservoir. By removal of the lower section the main, camshaft and connecting rod bearings may be examined and worked upon. The supporting arms are formed with the upper section. The crankshaft is $1\frac{3}{4}$ inches diameter with the front, middle and rear bearings $2\frac{3}{4}$, three and four inches length respectively, this giving a total bearing length of $9\frac{1}{4}$ inches, and the shaft is finished with flanges to protect against end thrust. The camshaft is carried on three bearings and is formed with the cams integral. The connecting rods are I section and the wristpins are steel tube clamped in the small ends of the connecting rods which oscillate in bosses in the piston walls. The connecting rod big end bearings are the full diameter of the main bearings and are $2\frac{1}{2}$ inches length.

The valves are made with nickel steel heads and carbon steel stems, electrically welded, with the stem ends hardened. These are fitted to the cylinder block in bushings. The tappets are a mushroom type and are operated in guides carried in an extension of the block base flange. The tappets are hardened and are fitted with adjusting screws and locking nuts.

Cooling, Lubrication and Ignition.

The motor is cooled by a circulation of water through the ample cylinder jackets and a large radiator, forced by a centrifugal pump driven from the timing gear, radiation being promoted by a fan driven by a flat belt from a pulley carried on an extension of the shaft that drives the water pump and magneto. The fan is mounted on ball bearings on an adjustable bracket. The radiator is a vertical flat tube construction with 58 square inches of cooling surface to every inch of front area. It is so mounted on helical springs that all vibratory stresses are eliminated.

The lubrication is by a force-feed, constant-level system. The oil is carried in the reservoir beneath the crankcase and



Side View of the 3000-Pound Delivery Wagon Chassis Built by the DeKalb Wagon Company, DeKalb, Ill.

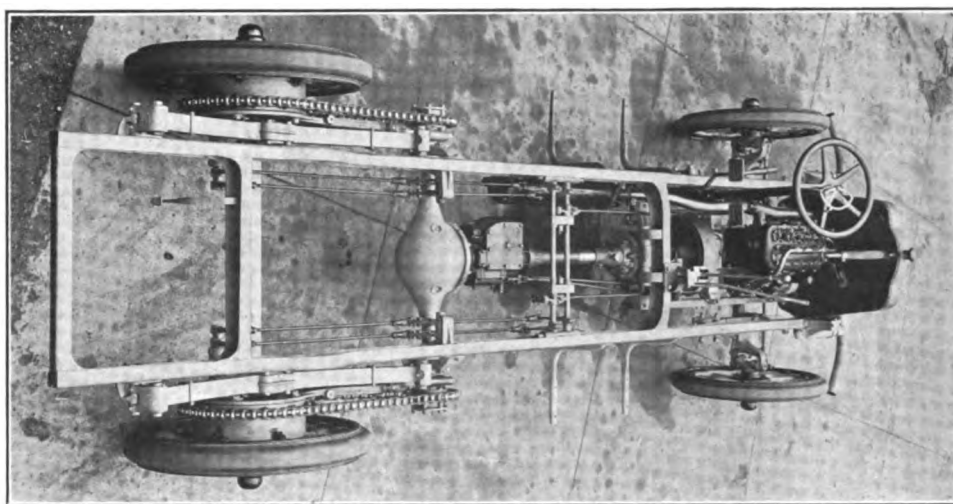
drawn through a filtration screen by plunger pumps operated by an eccentric on the camshaft. The oil is forced to points over the timing gears and the rear main bearing, the drainage accumulating in pits beneath the big ends of the connecting rods, the distribution by splash effectively lubricating the main, camshaft and wristpin bearings, the valve tappets and the cylinder and piston walls. The oil reservoir may be drained and the filter cleaned as desired.

The ignition is by a Mea high-tension magneto, the maximum spark being produced with any position, from extreme retard to extreme advance. The magneto is mounted on a bracket at the right side of the crankcase and is driven by an extension of the water pump shaft, with which it is flexibly coupled. The fuel is supplied by an automatic float-feed carburetor of the double-jet type, which is controlled by linkage with a lever on the steering wheel and by a foot accelerator. Two separate throttle valves are installed, both in the intake manifold, the one being connected with the hand and foot controls and the other with the engine governor.

The engine is governed to 1050 revolutions a minute and with a piston displacement of 280.64 cubic inches is rated at 27.25 horsepower by the S. A. E. formula. The motor will produce power much in excess of the normal rating. It is mounted in a sub-frame that is carried on two points at the forward cross member of the chassis frame, and is supported at a single point from a frame cross member, this affording sufficient protection from the stresses of chassis distortion.

Leather-Faced Cone Clutch.

The clutch is a leather-faced pressed steel cone that engages with the recess of the flywheel, the cone being fitted with flat springs beneath the facing that insure ease of engagement. The clutch is operated by a pedal that actuates a yoke that carries two ball bearings, this affording ease of operation, and a brake eliminates clutch spinning and makes speed ratio changes comparatively easy. From the clutch shaft a main driving shaft extends to the gearset, which is assembled with the jackshaft, there being an enclosed block and trunnion universal joint to compensate for angularity of the shaft. This joint is packed in grease. The shaft is carried in a torque tube, the forward end of which is mounted in a globe joint in a bracket supported by the rear end of the sub-frame. This frame also carries the clutch and brake operating mechanism, the supporting brackets being adjustable to compensate for wear of the clutch. The rear end of the torque tube is bolted to the gearset case. The gearset case and



Top View of the DeKalb Chassis, Showing the Long Frame and the Rear Spring Suspension and the General Construction Details.

jackshaft are mounted as a unit in spherical bearings in the jackshaft hangers, the entire driving system being supported at three points and in such a manner that every stress is eliminated.

Details of Power Reduction.

The gearset is a selective type having three forward speeds ratios and reverse, the shafts and gears being of nickel steel. The large shafts are mounted on Hyatt roller bearings. The gears are six pitch and the faces are one-inch width. The jackshaft is a full floating design, the driving shafts being carried on double annular ball bearings. The shafts may be easily removed for inspection. The sprockets are bolted on and are easily removable. The reductions in the transmission system are: In the gearset, first, 3.647:1; second, 1.692:1; third, 1:1; reverse, 4.766:1. By the jackshaft, first, 10.678:1; second, 4.954:1; third, 2.928:1; reverse, 13.960:1. At wheels, first, 24.911:1; second, 11.557:1; third, 6.831:1; reverse, 32.568:1. The revolutions a minute of the jackshaft, on a basis of 1000 feet piston speed a minute are: First, 112; second, 242; third, 398; reverse, 85; of the wheels, first, 46; second, 103; third, 175; reverse, 36. The drive from the jackshaft to the wheels is by side chains. The driving thrust is taken by radius rods that are rotatably mounted on the rear axle, forming the brake flanges, the two sections being coupled with vertical pins, and the forward ends are carried on the spherical mounts on the jackshaft housing. The rods are easily adjustable. When fully loaded the forward thrust of the rods is straight parallelism of the chassis frame.

Frame, Axles and Wheels.

The frame is a pressed steel channel section, 5.0625 inches width and with wide web, with four cross members and sturdy gusset plates. The frame is mounted on semi-elliptic springs, the front set being 40 inches length and $2\frac{1}{4}$ inches width, and the rear set 50 $\frac{1}{2}$ inches length and $2\frac{1}{2}$ inches width, with large shackles. The shackle bolts are $\frac{3}{4}$ -inch diameter, of $3\frac{1}{2}$ per cent. nickel steel, with integral grease cups. The frame is suspended between the rear springs, giving an extremely steady and low position for the body.

The front axle is an I section drop forging with Elliott type yokes, the wheel spindles being mounted on heavy pivots. The rear axle is a rectangular section $1\frac{1}{2}$ by three inches. The spindles and pivots are fitted with Timken roller bearings throughout. The wheels are wood, the forward wheels 34 inches and rear wheels 36 inches diameter, the former being fitted with 34 by $3\frac{1}{2}$ -inch tires and the latter with 36 by five-inch tires, both single bands. The wheelbase is 134 inches standard, or 144 inches when ordered specially, with 56 inches tread.

The steering gear is a Ross screw and nut construction of very substantial proportions. It is attached to the spring bracket at the left side of the frame, and to the steel toeboard, this insuring the full strength of the frame and an unusually stiff installation, while it is accessible for removal when desired. The linkage is adjustable and is spring cushioned. The fuel supply is controlled by a hand lever on the steering wheel and a foot accelerator, and the ignition by a hand lever. The foot pedals actuate the clutch and the service brake and the speed ratios and the emergency brakes are operated by hand levers centrally located. The internal expanding brakes operate in drums on the rear wheels, the shoes being of steel faced with Raybestos, and the drums 16 inches diameter and $2\frac{1}{2}$ inches face. The total braking surface is approximately 485 square inches. Both brakes are efficiently equalized. The chassis is built with a steel dash and toeboard and a rugged bumper is mounted to afford full protection. The chassis as shipped is equipped with driver's seat, under which is a seamless tank of 20 gallons capacity, running boards, fenders, dash and tail lamps, horn and set of tools.

The height of the body depends upon the equipment installed, but the frame is 30 inches above the ground without body or load.

The Firestone Tire & Rubber Company, Akron, O., is building two additions, 60 by 125 feet and 125 by 140 feet, to its plant, which will increase the floor area about 90,000 square feet. Besides the improvements a 4000-kilowatt generator and steam turbine will be installed, and a 70-foot gallery switchboard added.

Robert Wilde and Arthur P. Emmet have organized the Michigan Gear and Machine Company at Detroit, Mich., which will engage in the production of tools, gear cutting machines, etc., and the members of the concern will serve as consulting engineers with reference to gear making problems.

The following agencies have been made for the sale of the Koehler ton delivery wagon: T. G. Ladshaw, Spartanburg, S. C.; Bascom & Littlehale, Fitchburg, Mass.; Edward von Kattengell, Red Hook, N. J.; Union Motor Car Company, Lexington, Ky.; Bowles & Cutter, Lynchburg, Va.

FOUGHT WITH BLUE LAW.

Massachusetts Trolley Company's Method of Meeting 'Bus Competition.

The Massachusetts legislature just before its adjournment enacted a law which provides that "it shall not be unlawful to operate a motor vehicle on the Lord's day." This bill was admitted to the senate by the suspension of the rule governing the admission of legislation, the time for receiving new bills having expired, upon the recommendation of the joint committee on rules, was referred to the committee on legal affairs of the senate, favorably recommended by the committee and passed by the senate, and then by the house.

While the special attention given this bill is not without precedent, it is decidedly unusual, and was the result of the petition of a large number of citizens of Greenfield and vicinity, and realization of the possibility of consequences of the interpretation of a blue law made by Judge Field in the Greenfield district court, that driving an automobile on Sunday was prohibited and could be penalized by a fine. The decision was in the case of a driver of a motor 'bus that is operated in Greenfield in competition with the local trolley company, who was charged with driving a motor vehicle on the Lord's day, found guilty and fined.

The statement is made that the real reason for the prosecution was that the omnibus line was favored by the citizens, and a desire to place an obstacle in the way of it being operated Sundays, which is one of its most profitable days, prompted the arrest of its drivers. The legislators were informed that if the law was not modified or repealed, leaving the question of an owner driving out of the question, hired drivers could not legally drive machines Sundays, and there was reason to believe that the motorists generally would be subjected to extreme annoyance and, in the event of prosecution, much hardship wherever the police or constabulary were instructed to make arrests. As might be assumed the law would also prohibit the use of all public vehicles.

The condition was regarded as being so serious that the legislators immediately took it up and the bill quickly became law.

The Interboro Brewing Company, New York City, now has in its service 15 Garford trucks, the company reaching a determination as to the make that it would adopt after a test of a year in which a Garford machine was worked with five other machines. This concern has taken delivery of a two-ton chassis with an especially handsome enclosed body for case goods.

F. E. Pleasanton, superintendent of the Allentown, Penn., factory of the International Motor Company, has resigned that position and the factory operations are now directed by Vice President E. C. Fink.

TRAIN SOLDIERS WITH FEDERAL TRUCK.

MICHIGAN is, so far as is known, the first state in the Union that has provided a motor truck for the use of the volunteer soldiery of the state, which commands are now rated as a reserve of the United States army, and as such are subject to regular periods of training and in conditions which are expected to prepare the men for active and efficient service in the event of emergency.

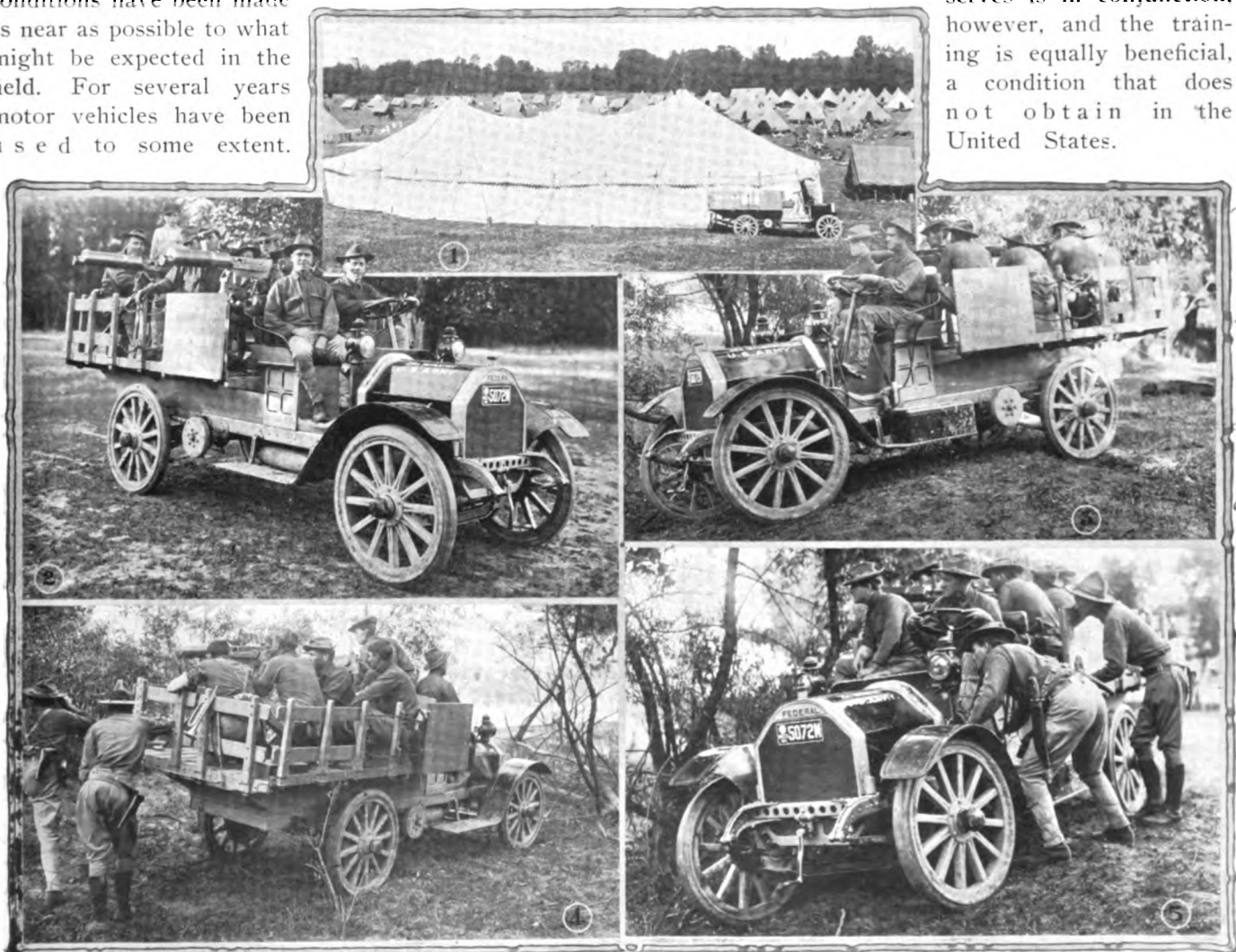
The policy of the nation was until a few years ago to maintain as small a regular army as was necessary to garrison different posts throughout the country and along the frontiers, depending upon the state militia as one source of increasing the army should there be occasion, and upon the response of volunteers for varying service should circumstances justify.

With the transformation of the state organizations of the national guard into a reserve corps and the unification of the commands into practically one organization, practise manoeuvres have been organized and extreme care taken to train the men. In connection with these annual encampments and mimic operations conditions have been made as near as possible to what might be expected in the field. For several years motor vehicles have been used to some extent.

The experience has been that the machines were in every way practical and results were accomplished with them that were not possible with animals or with railroads. The trucks and cars used were rented or were the property of some of the soldiers, and they were driven by hired drivers who worked well and were in every way capable, but with these men in charge of the machines the soldiers themselves did not obtain the experience that military prudence would dictate was necessary in the event of hostilities.

European Plan of Subvention.

In European countries the wagons and trucks are controlled by the subvention plan, by which the owners are required to place their machines at the service of the armies at a stated price a day. These machines are used by the commissary and quartermaster departments, or those that correspond to them, and the men in these divisions do all, or a great deal, of the work without the assistance of hired drivers, this affording them an experience that is extremely valuable. The practise of the regular army and the reserves is in conjunction, however, and the training is equally beneficial, a condition that does not obtain in the United States.



Michigan Army Reserve and the Federal Truck Used by the Fort Wayne Detachment: 1, As a Camp Pet It Always Attracts the Soldiers; 2, Carrying Two Machine Guns and Their Crews; 3, Placing It as a Machine Gun Platform in Preparation for Action; 4, Ready to Fight or Retreat; 5, Awaiting Orders.

Because of the enormous area of the Union, and the impossibility of having united army practise in any one locality, the operations are in different sections each year, and the different reserve forces are given the best development work that is practical. The states cannot be expected to provide complete motor vehicle equipment for the reserve regiments because of there being comparatively little need of them aside from the periods of actual practise, and the machines that have thus far been used for military purposes have been provided by different concerns and agents, largely because of the demonstrating possibilities, and not from any especially patriotic motives. With rare exceptions no state owns even the horses used for the cavalry and artillery, the animals being hired as occasion might necessitate, though in some of the armories provision is made for stabling them.

States Could Use Many Trucks.

As might be assumed, the purchase of motor trucks and wagons would entail the establishment of garages and making provision for the repairing and maintenance of them, and general expense would follow that would not show what might be regarded as sufficient returns by those who measured them by dollars and cents. Considering these possibilities, however, the conclusion must be reached that there is a great deal of work for which animals are now used that could be done with trucks were they owned by the states, and such machines could be utilized for the army in the event of need.

In connection with this subject one might point out that the United States army prepared specifications for motor trucks that would meet the requirements of the service, but none of the manufacturers would bid for the construction of these vehicles because of the wide departure from what has been regarded as standard practise, and machines built to the specifications would cost much more than the price the government was willing to pay. In Europe the manufacturers' standards are generally very nearly in accord with the subvention requirements, and no such condition is met with.

Michigan's Experiment with a Truck.

The State of Michigan, however, has purchased for its army reserve department a 3000-pound Federal truck that has been in service for a considerable period of time, and which has been proven to be one of the most practical and economical utilities the state possesses. In one sense the truck was experimental, yet there is every reason to believe that others will be purchased, for the machine has been tried in every condition that has been met with and it has been equal to all expectations.

The machine is stationed at Fort Wayne, and it is generally used by the men attached to that command, and it has been worked during manoeuvres at Trenton, Mich., during a national rifle contest at Camp Perry, Ohio, and in practise at Inkster, Mich., in every instance with extreme satisfaction. The results have demonstrated that one or more machines could be used

to excellent advantage during field work of any character, and for the transportation of all kinds of equipment, supplies, arms and men. For instance, this truck has been impressed into the service of other commands when needed, and on many occasions has done a great deal more work than could possibly be accomplished with animal vehicles.

For the quick movement of men it has proven invaluable, and where heavy haulage was necessary a small trailer was used, this, of course, being only practical where the roads were good. While one man generally drives the machine, the other members of the command it is used by have obtained a great deal of valuable experience, and they will, in the event of actual service, be well qualified to do work in connection with the operation and maintenance of the machines. In the field the truck is housed under a tarpaulin when rain falls, but aside from this but little attention is given, though mechanically it receives careful care and good maintenance.

There are other advantages in connection with the use of motor trucks for military purposes that are apparent, for they are generally easily supplied with fuel, oil and water, they cannot be stampeded, are not subject to disease, are more sanitary than animals, occupy less space, can be guarded by fewer men than horses or mules, are more easily screened and are a much smaller and less vulnerable target. In the event of attack every man is available for defense, and movements at night can be made almost noiselessly.

AETNA TRUCK SALES ORGANIZATION.

The Aetna Motor Truck Sales Company has been organized at Detroit, Mich., with capital of \$5000, to distribute Aetna trucks in Ohio, Indiana, Illinois and Wayne county, Michigan, with Frank N. Foster president, Edward Kinner secretary and treasurer, and J. G. Wagner and William A. Eldred as directors, with the two officers named. The Michigan Aetna Sales Agency will market Aetna trucks in Michigan.

The Power & Efficiency Company, Trenton, N. J., has been organized with H. T. Caultet as president, E. F. Cooper, secretary and treasurer, and M. T. Minogue, general manager, to manufacture a double ignition spark plug that has been invented by M. T. Minogue.

R. C. Norberg, assistant general manager of the Willard Storage Battery Company, Cleveland, O., is now in Europe, where he is to establish a branch of the company and service stations in several countries, and confer with those who are using LBA batteries.

H. E. Rice, who was advertising and sales manager of the Atwater Kent Manufacturing Company, Philadelphia, Penn., after a year's absence from business has resumed his position with the firm.

THE WHITWOOD 3000-POUND TRUCK.

CLAIMED by the maker, the Whitwood Corporation, of Weedsport, N. Y., to be an exceptionally efficient and enduring machine, the Whitwood chassis of 3000 pounds capacity has been placed in the market, either stripped or fitted with several types of conventional service bodies. The Whitwood truck was developed after upwards of a year's experimental work, and the purpose of the engineer designing it was to produce a vehicle that would have sufficient power and endurance in whatever use might be made of it. The Whitwood truck may be regarded as a standard for two reasons: but one size is built, and the machines are built of parts produced specially by some of the largest and best known manufacturers of the industry, who specialize the construction of components.

The designing of the machine consisted largely in harmonizing the different elements used in its construction, testing these so that they would be proven as to strength and endurance, and so combining them that there would be every desired quality of simplicity and accessibility. The company has standardized what is maintained to be an exceedingly powerful machine for its weight and capacity, that is extremely economical of fuel, and has remarkably efficient control.

Conventional Type Motor.

The motor is a vertical four-cylinder, four-cycle, water-cooled, L head type, with cylinder bore of $3\frac{3}{4}$ inches and stroke of five inches, having a rating by the S. A. E. horsepower formula of $22\frac{1}{2}$ horsepower, but which is claimed to develop considerably in excess of 30 horsepower. The cylinders are cast en bloc, with the water jackets integral, and the cover of the cylinder head jackets is a bronze plate that is retained by a series of cap screws. The crankcase is an aluminum alloy casting in two sections, the upper portion of which carries the three main bearings. The lower half is divided by a web, beneath which is the oil reservoir.

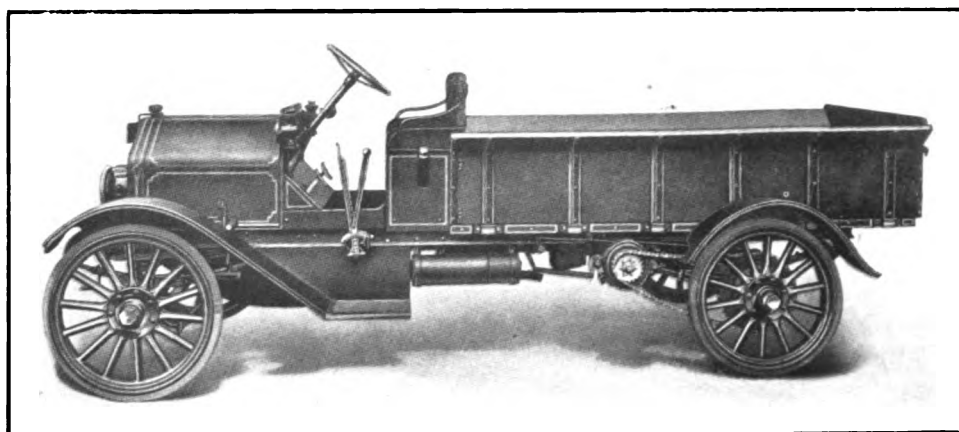
The pistons are made with a taper fit to provide for head expansion and are fitted with four eccentric compression rings, as well as four oil grooves. The crankshaft is $1\frac{3}{4}$ inches diameter at all the bearings and the main bearings have a total of $9\frac{1}{2}$ inches length, the rear bearing being four inches and the centre and forward bearings each $2\frac{3}{4}$ inches. The camshaft is carried by three bearings, 15-16 inch diameter, and the forward and centre bearings are each $2\frac{3}{4}$ inches length. The cams are forged integral with the

shaft. The connecting rods are I section and the wrist-pins are large steel tube.

Ample Engine Bearings.

The main and connecting rod big end bearings are babbitt-lined bronze shells, and the connecting rod caps are secured by two bolts. All other engine bearings are phosphor bronze. The valve ports are large and the valve heads are nickel steel, electrically welded to carbon steel stems. All valves are interchangeable. The valve guides are cast iron and are made very long to insure against wear and leakage. The tappets are tool steel, large in size and fitted with adjusting screws. They are carried in phosphor bronze guides bolted to the crankcase. The valve mechanism is entirely enclosed by aluminum cover plates that are almost instantly removable.

The motor is lubricated by oil drawn from the oil reservoir by a gear pump on the outside of the crankcase, driven by spiral gears from the camshaft. The



The New Whitwood 3000-Pound Capacity Truck Chassis, Fitted with a Standard Type of Open Express Body.

oil is forced through a duct cast integral with the crankcase and ducts drilled in the crankshaft to the main bearings, and to the timing gears. The bearings are constantly flooded and the centrifugal movement of the shaft distributes the lubricant throughout the interior of the motor, thoroughly lubricating every part. The oil is filtered in circulating. The motor is cooled by thermo-syphon circulation of water through a large tubular radiator, radiation being promoted by a fan driven by a flat belt from an extension of the magneto shaft. The fan is mounted on ball bearings on an adjustable bracket. The carburetion is by an automatic float feed type of carburetor and the ignition is by a Bosch high-tension magneto with a fixed spark. The motors are protected by the Woodworth lubricant-operated cut-off, which will automatically stop the motor in the event the supply of oil shall fail, and the engine cannot be started until the oil reservoir has been replenished. The motors are governed to 15 miles an hour speed, and ignition is cut off should there be endeavor to exceed this.

Power Plant in Sub-Frame.

The motor and radiator are mounted in a sub-frame that is supported by a trunnion at the forward end and by a heavy steel cross member at the rear. The clutch is a leather-faced aluminum cone. The power is transmitted by a shaft having two universal joints, and a selective type gearset, having three forward speed ratios and reverse, that is assembled with the full floating jackshaft. The jackshaft is carried in heavy hangers. The shafts are mounted in ball and roller bearings. The final drive is by side chains to the rear wheel sprockets.

The frame is a pressed steel channel section four inches width, with cross members with heavy gussets hot riveted. The frame is mounted on semi-elliptic springs, and is also fitted with a jack spring. The spring eyes are bushed with steel and the spring bolts are large and fitted with grease cups. The front and rear axles are I sections $1\frac{7}{8}$ by three inches, and the spindles are two inches diameter. The front axle pivots are mounted on ball bearings and the spindles are fitted with roller bearings. The wheels are 36 inches diameter, with 14 two-inch spokes, and are shod with $2\frac{1}{2}$ -inch solid clincher tires forward and $3\frac{1}{2}$ -inch solid demountable rear. The steering gear is a double sliding block type with unusually heavy linkage and is so installed that it may be removed quickly should occasion require. The gear is adjustable for wear throughout and is spring cushioned. The drive is at the left side with an 18-inch wheel and with the control levers at the driver's left hand. The clutch and service brake pedals and the accelerator are conventionally located.

The service brake operates on 10-inch drums on the jackshaft and the emergency brake on 14-inch drums on the rear wheels. The wheelbase is 130 inches and the tread 56 inches, though made 60 inches for southern roads. The machines are delivered with the usual tool kit, jack, oil dash and tail lamps, horn, and seat cushions.

Postmaster W. J. Murphy of Cleveland, O., has made application to Postmaster-General Burleson, with recommendation, that a number of motor trucks be purchased for the delivery of parcel post packages in that city, to replace a number of motorcycles, the claim being made that the package boxes of the motorcycles are not sufficient for the loads that must be taken out by the carriers.

The United States Light & Heating Company has established a Washington, D. C., sales office at 1420 New York avenue, which is managed by W. G. Davis, who was formerly in charge of the sales department of the New York City office.

A New York City branch has been established at 50 Church street by the A. R. King Manufacturing Company, Kingston, N. Y., builder of King trucks, which is in charge of William C. Hunter.

CAPTURE UNATTENDED TRUCKS.

New York Police Enforcing Ordinance Prohibiting Storage in Streets.

The owners of machines of all kinds in New York City, and especially the owners of garages, are the victims of a spasm of virtue by Street Commissioner Featherstone, who has begun the enforcement of an ordinance that has been neglected for years, and was unearthed by some one who apparently was desirous of creating additional trouble for those possessing motor vehicles or engaging in any business in which they are used.

The ordinance prohibits any person leaving a vehicle in a public street unattended, and when this was enacted it was intended to apply to animal carriages, wagons and trucks. In fact, a very large number of vehicles are left standing in the streets, this being particularly true of some of the down town commercial sections.

But thousands of people have been accustomed to keep their machines in the streets, though generally in front of residences and places of business where they could be observed, and in many instances the overflows from stables and some of the garages have been kept in the thoroughfares, especially during the nights. Because of the comparatively few garages in the business districts and the unwillingness of owners to keep their machines long distances away, public service stations, that have been filled beyond capacity, have undertaken to give the best service that may be practical, the surplus being moved from street to garage as occasion might require.

When the campaign of the street commissioner was begun the owners of a number of trucks seized during the night were required to pay a fine of \$10 to regain possession of their property, while pleasure cars were released for half that price. Attention was first directed toward garages that used the streets for all kinds of work, even washing and repairing, whose owners had been notified, but the intention is to enforce the ordinance in all sections until the streets are kept cleared.

The plant of the Electric Vehicle Company, later the Columbia Motor Car Company, and a branch of the United States Motor Company, at Hartford, Conn., has been purchased by the Billings & Spencer Company of that city. The plant will probably be equipped and worked to its capacity and two small factories of the company will later on be closed and disposed of, concentration being the policy that prompted the purchase.

The Universal Motor Truck Company, Detroit, Mich., has engaged Vincent Link as chief engineer. Mr. Link was formerly connected with the company's engineering department and resigned to identify himself with other interests.

FRENCH GASOLINE-ELECTRIC TRACTORS.

The Balachowsky & Caire Machine, the First European Development, Has Novel Qualities and Equipment and Shows High Efficiency During Official Trials.

DURING the past two years much attention has been directed by European governments toward the utility of tractors for military purposes, and trials have taken place to determine the practicability of differing types and constructions. The necessity of transporting large quantities of supplies and stores with each corps or division of an army when operations are not along lines of railroad communication, and the limitation of trucks so far as load capacities are concerned, has led to investigations of possibilities with tractors and trailer trains, with a view of using these on all kinds of highways.

Great capacity for haulage and reliability are two essential factors, and to realize a large measure of the mileage of the gasoline vehicle and the flexibility of the electric the firm of Balachowsky & Caire has developed a gasoline-electric tractor that is driven by four wheels. This machine has a number of very interesting and several novel features. The gasoline motor drives a motor that is designed to be self-regulating and have automatic excitation, so that all power is controlled by the regulation of the fuel supplied the motor, while the controller is used merely to obtain forward or reverse movement of the tractor.

The tractor is used for the haulage of trailers and there is a special towing attachment for the trailers that obviates all of the difficulties met with operating road trains. The equipment is especially for military service and the wheels are fitted with tires that operate upon the principle of caterpillar reaction. The wheels are said to afford a very high factor of traction.

The following description of the Balachowsky & Caire tractors, which have been termed "Tractors of Total Adhesion", is by L. Ventou-Duclaux, a well known French engineer, and is translated from Le

Poids Lourd, as is the observation of practical trials by Commandant Ferrus, whose attention was given officially:

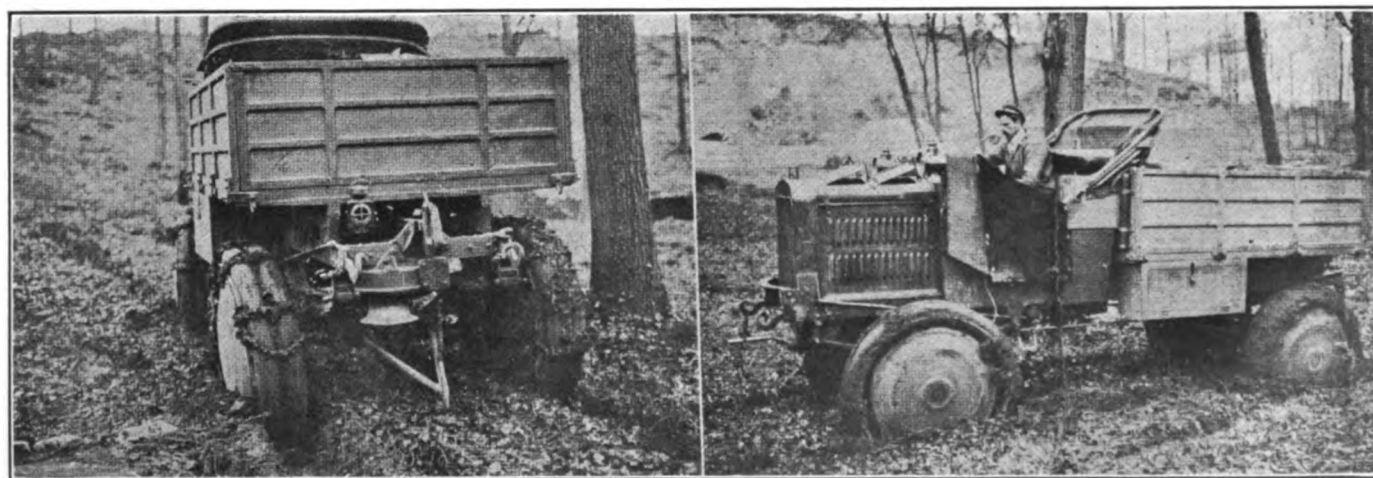
When it is desired to travel over the roads with any considerable load, it is quickly found that it is necessary to employ vehicles having all four wheels driven by motors, known as tractors of total adhesion. This, in effect, is the only means of not exceeding the limit fixed for the weight to be carried by each axle. In the first place, theory and experience show that this class of vehicles is especially fitted to travel over variable surfaces and to pass over obstructions. In soft ground this matter becomes very serious, for it is found that in the necessity of reducing the load upon each axle, the use of heavy tires on the vehicles must be avoided in order to conserve all the power possible for the tractive effort. These two conditions, being somewhat contradictory, are all the more difficult to reconcile with each other, as even with wheels provided with rubber tires one cannot count upon a coefficient of adhesion beyond 0.50 (which corresponds to a tractive effort equal to half the weight carried by the axle). In the second place, one wishes to be able to control the four wheels of the vehicle he uses and to have it designed so as to permit it to turn in a circle, the diameter of which is as small as possible.

The experiments made up to the present time have been upon two different types of vehicles, tractors with mechanical transmission and tractors with electric transmission.

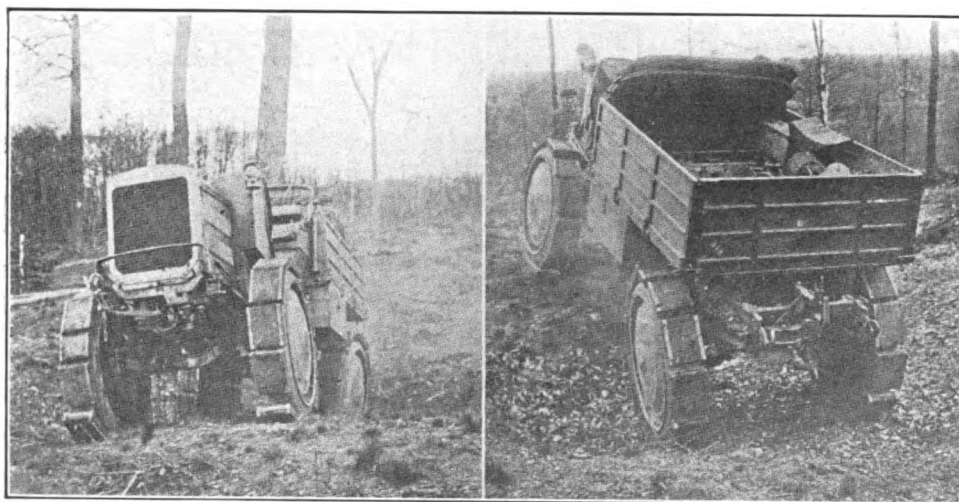
The first class has called forth a number of extremely ingenious solutions, but necessarily a little complicated. It has, in effect, been found necessary to introduce, between the internal combustion engine and the wheels, a transmission which reduces the speed in the proportion of 100 to one, this necessarily absorbing a large portion of the power of the engine. Likewise, the vibrations very frequently impose a considerable stress upon the transmission which soon interferes with its operation and causes it to wear rapidly.

In the second place, the chassis of these vehicles are called upon to undergo noticeable deformation. As will be noted, the conditions of operation are far from being those of a vehicle driven by two wheels, and advantage has been taken of the operation of these latter in order to evolve tractors of total adhesion with a mechanical transmission which will give identical results. Therefore, where the wheels slip from lack of adhesion it is indispensable to block the differential. At this time the control is excessively trying and this manoeuvre presents some difficulties. Experience has shown that many of the mechanical brakes are inefficient and a prolonged descent invites the rapid destruction of the friction surfaces, and this constitutes a real danger.

As far as we know, the concern of Balachowsky & Caire is the only one in France, which, up to the present time has constructed tractors driven by all four wheels with purely electrical transmission. The application of this mode of transmission, which has given such interesting results with industrial vehicles driven by two wheels, has been to what are designated as tractors of total adhesion. For a long time vehicles of this type with four motor driven wheels had been



The Balachowsky & Caire Tractor Crossing Marshy Land: Left Illustration Shows the Capstan and Sprag Used for Towing; Right Illustration Indicates the Depth the Wheels Had Sunken into the Earth.



The Balachowsky & Calre Tractor, Fitted with Caterpillar-Like Tires, Ascending a Short Steep Grade on Soft Ground: At the Left a Front View, and at the Right, as Seen from the Rear.

used as fire engines, but it is within the last two years that these tractors have been experimented with and adapted to military needs.

One disadvantage claimed in regard to this type is that the point may be reached where nothing more can be accomplished, but it must not be forgotten that this hypothetical point is far removed from the lower limit of practical operation. This argument therefore has an interest purely theoretical and affords an analogous phenomenon, as, in the case of the mechanical transmission, it can be very well used for purposes of comparison.

A little closer examination of the figures given shows, moreover, that the inferiority of the device does not exist, but on the contrary, it is superior in certain cases to the results obtained with mechanical transmissions. Take, for instance, the following interesting example:

Two trucks of three tons hauling capacity, both having engines of the same type, of 22 horsepower, having an average consumption, in the case of the mechanical transmission, of 36 to 38 liters to the 100 kilometers; then the truck with the electrical transmission (driven by two wheels) will consume but 30 to 32 liters; both vehicles were new.

General Data—Advantages.

Before examining the figures, it would seem advantageous to give briefly an idea of the Balachowsky & Calre system.

A self-propelled vehicle requires for its propulsion a very variable power, since it travels over surfaces varying from hard, level and dry, to a grade of 25 degrees for example, passing through all the intermediate grades and over all kinds of ground.

If, as a source of mechanical power an internal combustion engine is employed, it is necessary to have recourse to components which will transform this energy and transmit it to the wheels. A transmission would be perfect if the power required by the vehicles corresponded to a speed which would permit the utilization of all the power of the engine. But the mechanical means commonly employed (chains, gears, clutches and differentials) are far from fulfilling the conditions. In order to meet these variable conditions, recourse is had to abrupt gearshifts and the distribution of the power of the engine over three or four points and the use of three or four different speeds.

The electrical transmission in trucks, as we know it today, obviates all these inconveniences since it includes no chain, gears, clutch or differential. The power is transmitted simply by the use of electro-magnetic principles, that is to say, by means of a motor-generator, self-regulating, which actuates electric motors placed on the hubs of the wheels, both front and rear.

The idea of the electrical transmission is not new, it is true, as it has evolved from the tendency plainly marked in the industry to utilize for all kinds of work a power plant which is very flexible, economical in maintenance, but always very sure in its operation; but in its application for use for the propulsion of vehicles many great difficulties have arisen.

The complete suppression of all intermediate mechanism (chains or gears) furnishes in itself a reason for the utilization of the electrical transmission where it is necessary to have motors of slow speed fixed directly upon the wheels of a vehicle. This kind of transmission has always been considered practically as something which could not be accomplished, since it was always thought impossible to secure high power with light weight.

Features of the Power Application.

The Balachowsky & Calre wheel motors possess the essential qualities. They combine the advantage of great mechanical solidity with a low heating point. These motors are absolutely hermetical and can be removed from the axle very quickly. The mounting and demounting of the entire motor is accomplished by an operation practically similar to that of ordinary wheels—that is to say, a simple screwing and unscrewing, the hub being held on by a master nut which screws into the end of the axle spindle.

The combustion engine is coupled directly to the generator, the rotor of which forms the flywheel of the engine. This generator merits special mention. The great obstacles lie especially in the matters of self-regulation and self-excitation. Self-regulation is obtained by the formation, in the centre of the armature, of a zone in which circulate compensating currents which assure the diminution of the flow at the moment when the amperage is increased, and inversely, so that the power absorbed by the generator remains constant. The speed of the motor also remains constant, but this regulation is so exact that it will apply to all rates of speed, even the slowest.

It is not necessary to regulate the power of the electric motor to correspond with that of the engine, as the power of the latter is constantly utilized at its maximum.

The automatic excitation is obtained by means of a very simple device without the use of accumulators or exciters. It may be recognized that this system affords the best conditions of control and flexibility, since there is no lever nor change of speeds necessary. The amount of gas admitted alone gives all ranges of speed.

The Method of Control.

A controller, which need never be operated while on the road, is provided to give the speeds forward or reverse. The characteristics of the automatic excitation are such that there is imparted to the vehicle a to-and-fro movement analogous to that of a pendulum ticking the seconds, by the simple setting of the stop for the advance or reverse position.

When it is wished to ascend a hill the following is the method of procedure: The effort of starting to climb the grade automatically reduces the speed of the vehicle even when the gas engine is running at full speed; naturally the driver is able to reduce the speed by controlling the admission of the gas.

We wish to emphasize the point that the number of speeds is limitless. Each position of lever which controls the admission of the gas corresponds to a controller which is so set as to allow the most perfect utilization of the power supplied by the engine, and this control is accomplished with the greatest ease.

In the Balachowsky & Calre electric transmission the rate of speed is independent of that of the engine, the power absorbed in propelling the vehicle alone determining the speed of the engine, while the mechanical connection of the engine and the wheels of the ordinary vehicle makes the speed of the latter in direct proportion to the number of revolutions of the engine, and this, independent of the load carried, works contrary to the economical utilization of the power.

General Advantages of the System.

Following is a brief enumeration of the other advantages of this system: The working mechanism does not easily get out of order, and the efficiency does not diminish with continued use as is the case with mechanical transmission. The maintenance expense is very moderate.

It is unnecessary to carry on hand any large stock of parts as a few changes of wheels are sufficient to assure the continued service of a large number of vehicles, and the chances of damage are very much less than in other systems. The absence of abrupt stresses from braking is resultant in a noticeable economy of wear upon the tires. A moderate brakeage can be obtained at will through the motor wheels without the use of friction brakes. It may be said, in connection with this phase of the subject, that the retarding effort remains constantly within the limits of the adhesion of the wheels, and a positive method of brakeage can be obtained in the event of an emergency, equal to that possible to be secured by mechanical brakes, when from the blocking of the wheels and the lack of adhesion the vehicle glides without the wheels turning. The vibrations of the engine are not transmitted to the chassis, on account of the elastic suspension of the electrical plant; the quietness of the transmission makes these vehicles very comfortable.

The great freedom from complexity makes the chassis entirely independent of all the components of the transmission, making it adaptable to many different bodies. The energy produced by the electrical generating plant is capable of a large number of applications: Supplying power for an electric motor to operate a capstan or windlass, furnishing light for a plant, to actuate machine tools or hoisting apparatus installed upon the vehicle itself, and to supply searchlights.

The electric generating plant may be used without a rheostat or other special precautions, thanks to the automatic regulation of the generator.

It is to be noted that the internal combustion engine, a type which, moreover, requires but small upkeep in vehicles with mechanical transmission (compared with the components of the transmission) works under very advantageous conditions in a vehicle of the type we are describing.

There is, in effect, no mechanical connection between the wheels and the engine shaft, but simply a magnetic connection which traverses an air space which gives the transmission a progressive effort without stress, whatever the conditions of operation may be.

DESCRIPTION OF THE ELECTRICAL EQUIPMENT.

Let us examine now the characteristics of the electrical equipment of the Balachowsky & Caire tractor type TC14. They are stated by the manufacturer to be as follows:

Self-Regulating Generator.

Weight, 380 kilos; maximum speed, 850 revolutions a minute; maximum voltage, 250 volts; maximum amperage, 400 amperes; maximum power, 50 kilowatts (voltage and amperage variable); resistance of armature at brushes, 0.008 ohm; output of armature at 400 amperes, $0.008 \times 400^2 = 1.280$ watts; output from revolving armature at 160 amperes, $0.008 \times 160^2 = 205$ watts; output at highest voltage, 450 watts; output at lowest voltage, 300 watts; loss in current from lag, mechanical and frictional losses, 1500 watts (this loss is constant at nearly three per cent.) Total: $400 \text{ A} \times 126 \text{ V} = 50.4$ kilowatts (the most unfavorable).

Ohmic resistance.....	1280 watts
Lag, etc.....	1500 watts
Excitation	300 watts

Total.....	3080 watts
50,400	
Total output: $\frac{\quad}{50,400 \times 3080} =$	94 per cent.

Motor Wheels.

Diameter of tires, 1m. 160; weight of motor, 420 kilos; resistance of armature and series inductor, 0.11 ohm. The two motors on the same axle are in series and the two axles are in parallel.

Connections of equal potential allow the automatic return, in case of the failure of one wheel, of the power to the generator on the other wheels.

For each axle consuming 25,200 watts ($200 \text{ A} \times 126 \text{ V}$) there are:

	Watts
Ohmic resistance $0.22 \times 200^2 =$	8,800
Mechanical losses, lag, etc.....	220

Total	9,020
Available power	16,180

Power absorbed	25,200
Total gross output.....	65 per cent.

The total net output is 62 per cent. At this time the total tangential force is 3200 kilograms and the speed 3.6 kilometers an hour, that is to say, almost the limit allowed by the adhesion.

Take, for instance, a tractor drawing a total weight of 22.5 tons; the total tangential effort will be about 700 kilos on a good road, that is to say 175 kilos to each motor, which corresponds to an amperage of 80 amperes.

At this rate the total amount of the power of the engine is not used, as the speed cannot be practically increased to more than 16 kilometers an hour, the formula being as follows:

Ohmic resistance for each axle, $0.22 \times 80^2 =$	1,408 watts
Mechanical losses, lag, etc.....	120 watts
Available power	15,120 watts

Watts absorbed ($80 \text{ A} \times 208 \text{ V}$).....	16,648 watts
Total output, 92 per cent.	

Output of generator ($160 \text{ A} \times 208 \text{ V}$) =	33,296 watts
Ohmic resistance, 0.008×1.602	205 watts
Excitation	400 watts
Mechanical losses, lag, etc.....	1,500 watts
Available power	33,296 watts

Power absorbed	35,402 watts
33,296	

Gross output $\frac{\quad}{35,401} =$	94 per cent.
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35,401	
Total net output, 86.5 per cent.	

Between these two extreme points it is interesting to note the output when the tractor furnishes a resistance of 1800 kilos, this representing a total load of 22.5 tons up a grade of five per cent. (good road).

According to the capacity of the motors, a load of 450 kilos corresponds to a current of 148 amperes for each motor and a speed of 9.5 kilometers an hour at 170 volts.

Ohmic resistance per axle, $0.22 \times 148^2 =$	482 watts
Mechanical and frictional losses, etc.....	220 watts
Available power	24,300 watts

Total	25,002 watts
24,300	

Gross output $\frac{\quad}{25,000} =$	96 per cent.
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Capacity of generator $296 \text{ A} \times 170 \text{ V} =$	50 kilowatts
Ohmic resistance 0.008×296^2	780 watts
Excitation	380 watts
Mechanical and frictional losses, etc.,	1,500 watts
Available power	50,000 watts

Total	59,580 watts
50,000	

Gross output $\frac{\quad}{59,580} =$	95 per cent.
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59,580	
Total net output, 91 per cent.	

Tractor alone, total load, 300 kilos; amount of current supplied by each motor, 55 amperes; speed, 25 kilometers an hour.

Ohmic resistance per axle, $0.22 \times 55^2 =$	67 watts
Mechanical losses, etc.....	220 watts
Available power	11,000 watts

Power used	11,287 watts
11,000	

Gross output $\frac{\quad}{11,287} =$	97 per cent.
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Capacity of generator $110 \text{ A} \times 205 \text{ V}$	
Ohmic resistance $0.008 \times 110^2 =$	100 watts
Excitation	400 watts
Mechanical and frictional losses, etc.,	1,500 watts
Available power	22,600 watts

Total	24,600 watts
Gross output, 92 per cent.	

Total net output, 89 per cent.	
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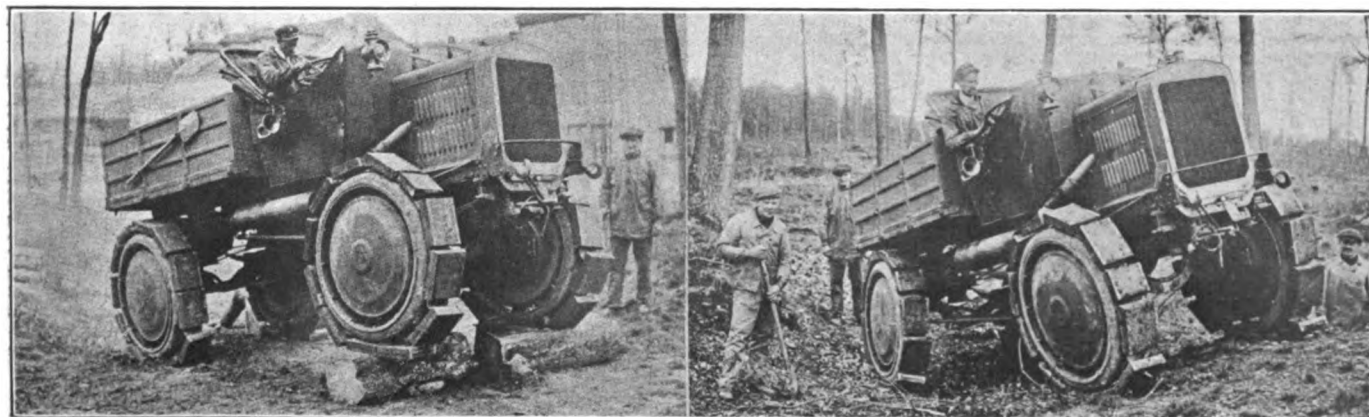
As will be seen, between the extreme capacity of a single tractor, for example, and the maximum permitted by the adhesion, the output is very much increased; on the one hand, a load of 3200 kilograms is not far from the limit, this increasing proportionately to the amperage (the magnetic circuit of the motor being already charged to its capacity) and the point of equilibrium, where the output is zero, is about 330 amperes a motor which corresponds to a load of 5000 kilograms, which is practically unavailable. The strength of the current in the armature being very weak, the generator and the motors are protected from all deterioration from excess voltage. The combustion engine is allowed, as it were, to supply current of a strength only up to a little less than the prescribed limit.

General Description of the Tractor.

Chassis—The chassis proper is made up of two straight bars of steel, joined by cross pieces also of steel, the whole held together by riveted braces, which assures a very solid assembly and one which at the same time gives a certain elasticity indispensable in this type of vehicle. The chassis is strengthened at each corner by braces, and at the rear is found a spring towing device; the French artillery model towing apparatus is equipped with a spring which gives a play of about 160 millimeters.

Springs—The chassis is suspended on manganese-silicon steel springs, both front and rear; they are designed to support, in addition to their normal load, the reactive stress of the wheel motors.

Axles—The axles, front and rear, are of Martin superior forged steel; that form is especially designed to give the maxi-



Examples of Balachowsky & Caire Tractor Chassis Distortion: At Left, the Machine with the Front Wheels on Two Large Logs; at Right, Moving Through a Hollow in a Rough Field.

imum resistance. There is supplied at each end an axle housing which receives the spindles. The spindles are conical and have collars upon which the motor wheels are fitted.

Steering Mechanism—The steering mechanism is very simple, consisting of one screw of a single thread. The steering lever operates directly upon the steering drum, which turns the front axle, and by means of a crank and shaft, the steering arm also turns the rear axle.

Mechanically Operated Brakes—A very powerful mechanically operated brake works on each wheel. They are entirely independent of the movement of the wheels and their operation is certain no matter in what position the wheels are. These brakes are actuated either by pedal or by a lever and ratchet. In operating the pedal the motors on the wheels are stopped. The adjustment of these brakes is accomplished very easily from the outside. The steering system includes positive compensation for the stress upon the wheels.

The Electrical Plant—The electrical plant consists of an internal combustion engine and generator, which are mounted on a secondary chassis suspended upon the principal chassis by four blocks of rubber to give elasticity.

Engine—The engine has four cylinders of 120 millimeters bore and 250 millimeters stroke, making about 850 revolutions and giving 65 horsepower. The ignition is high-tension. The carburetor is adapted for gasoline, benzole or carburetted alcohol; lubrication is by compression, and the motor cooling system is by gear driven pump.

Generator Type G. E. 234—The generator is fixed directly upon the shaft of the engine, the outside armature having the same speed as the engine, the stationary member, the inductor, being supported at the rear by the cross pieces of the secondary chassis.

Wheel Motors, Type T. C. 14—The motors are all absolutely identical and may be removed from the axle very quickly; the mounting and demounting of the motor unit is accomplished by the simple screwing and unscrewing of the hub of the wheel, which is held by a master nut screwed into the end of the spindle of the axle.

The body of these wheel motors is entirely of steel of great strength and the bearings are upon balls of large diameter, which turn with friction so slight as to be almost negligible.

The diameter of the rim of the wheel is one meter and the width is 270 millimeters. It is designed to have dual tires of a width of 120 millimeters, their diameter being 1.160 meters.

The wheels are supplied on each side with hooks of cast copper, designed for the attachment of anti-skidding chains, and those sides of the wheels towards the inside of the chassis are furnished with brake drums.

Electrical Braking System—Independent of the mechanical brake is an electrical braking system obtained by a simple manipulation of the controller, the wheel motors then becoming generators through the force of gravity, the current which they produce also being absorbed by efficient resistants.

The Controlling Components—A controller governing the various speeds, easily operated and accessible, is at the left of the driver. By means of this controller the driver can obtain the forward speeds, or use it as a brake by setting it for the reverse. The controller is never operated while the vehicle is in motion. It is set at the desired position, at a predetermined time, actuating solely the lever which controls the admission of the gas, or upon the accelerator pedal which may be employed coincidentally with the lever. It does not control the changes in speed.

Electric Equipment—The electrical equipment is composed of extra flexible wiring, enclosed in a heavily insulated covering, and made so the wiring may be completely covered by water without detriment. The connections are of one piece and no joint exists between any two points. The assemblage of the electrical equipment is arranged in such a manner that it can furnish energy four or five times as strong as that demanded by the vehicle. While the maximum voltage does not exceed 250 volts, the components are tested to 1500 volts 50 cycle alternating current. The bobbins are carefully insulated by many layers of varnish especially applied after baking. The motors are completely air and water proof; the vehicles can

encounter sea water at a depth of 70 to 80 centimeters without inconvenience.

Capstans—The drum of the capstan is fixed to a worm wheel, which is operated by a screw carried on the shaft of an electric motor. The wheel and screw are enclosed in a case of bronze, filled with lubricant. The screw has adjustable ball bearings. The speed ratio is 35 to 1. The electric motor has two movable parts, the armature and inductor; the armature actuates the screw, and the inductor, by reacting, operates the drum, winding up the cable automatically. When the cable on the capstan does not have sufficient tension a brake operates on the rotor so as to accomplish automatically the rotation of the windlass. One man can pull directly a vehicle with a length of 100 meters, the pull being limited at this particular time to 1800 kilos. By using a train of two or three pulleys, double or triple the pull can be obtained. The cable is extra flexible, of steel, of a diameter of 14 millimeters. The tractors are designed according to the provisions of the French military society for 1914, except that the ground clearance is 50 centimeters instead of 30, as required by the aforesaid regulations.

This tractor has been, for some time, undergoing some interesting trials by Commandant Ferrus, who gives an account of them elsewhere.

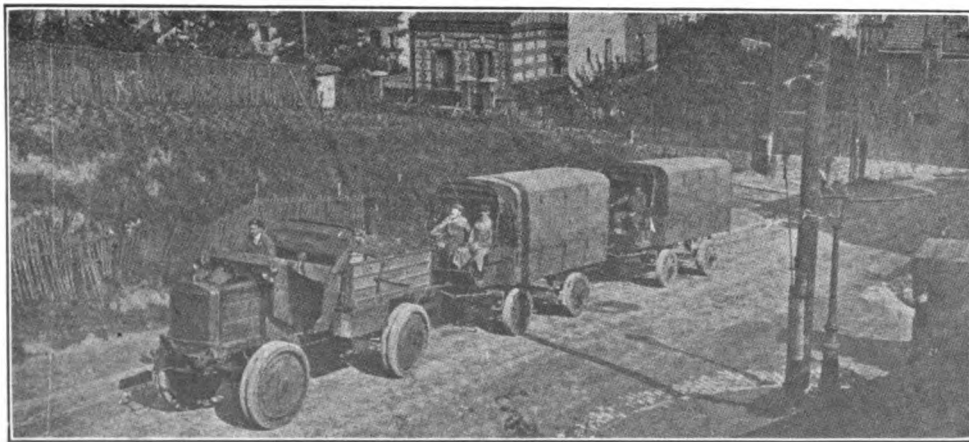
COMMANDANT FERRUS' REPORT.

Some observations of the Balachowsky & Calre tractor. The towing system and the control of the trailers.

The trailers are drawn by means of a bar or yoke upon the front of the chassis of the rear trailer, which is fastened in a manner so as to afford elasticity to a hook on the preceding vehicle. It will be seen that, contrary to the conventional practise, the haulage is not by means of a triangular yoke upon the front trailer of the train. This latter arrangement, when adopted on vehicles which are not fitted with a very long tow line, causes them to travel within a circle described by the preceding vehicle, and, as a result, the last vehicle of the train is forced to take the inside of the curve, and this often becomes very difficult.

In the present instance this inconvenience has been offset by the separation of the towing system from the steering system, this latter being operated solely on the front member of the train. This member has, it is true, a sort of triangular yoke towing arrangement, but it is used solely to govern the direction. The towing bar has, on its under side, a bolt which slips into a groove in a false triangular yoke, forming a false steering pole. The centre of oscillation of the towing bar being confined in front by the pole bolt of the front member of the train, the result of this arrangement is that the front vehicle always turns in an angle less than that in which the towing bar itself must turn. It is also quickly seen, without striving to establish a general correspondence between the angles described, that the distance between the pole bolts and the point of attachment of the towing bar is equal to the distance from this latter point to the grooved tongue; the angle described by the front member of the train is always half that described by the towing bar. Under these conditions it will be understood that it would be easy to arrange the entire system so that the wheels of each following trailer will pass practically in the same tracks as those of the preceding trailer, this accomplishing the solution of the problem of correct turning. This solution is very satisfactory and appears to have given excellent results. It has, above all, the advantage of being very simple, does not necessitate the use of any sturdy components and does not increase the length of the train of trailers. Furthermore, the steering mechanism of each vehicle, being dependent upon the vehicle which preceded it, the wear on one of them is not duplicated on the following; also it will be seen that the motion resulting from the play of the mechanism does not increase from the head to the tail of the train to such a degree as to become dangerous; also other systems of control have been evolved which, while very ingenious in theory, are little suited to practical needs.

The capstan used on the Balachowsky & Calre tractor is an inverted capstan of the drum type, placed at the rear of the tractor. It is actuated by an endless screw turned by an electric motor. This capstan, which takes the form of a hyperboloid of revolution, has a rather small diameter (about 22 centimeters), and this would seem to indicate the use of a steel cable of small diameter. But the cable used (14 millimeters) is extremely flexible, and, furthermore, the lineal speed is sufficiently small, so that with two men and a free belt and five turns of the cable around the drum of the capstan, it has been demonstrated that with a single belt a rolling weight of 15 tons can be hauled up a grade of 11.5 in 100. (Pinevins street at Puteaux at the foot of Sadi-Carnot street). The tractor itself (weighing 7470 kilograms) remains perfectly immovable during the hauling, due to its clogs, and above all due to four large curved brake blocks of suitable design. These results are interesting, as they always have here-



Balachowsky & Calre Tractor During Official Trials, Hauling Two Loaded Trailers up an 11 Per Cent. Gradient Without Special Tire Equipment.

fore been very difficult to obtain. In the rivalry that exists between the windlass and capstan, it constitutes an important argument in favor of the latter device.

The Rims of the Wheels.

The tractor takes wheel rims of the ordinary Bonagente type, fitted for dual rubber tires. This rim is composed of a series of pieces, not hollowed out like the ordinary Bonagente rims, but in the form of T iron, the inside rim of which comes between the two tires (see photograph). Upon each axle, uniting two successive parts of the rim, is found mounted a large block of wood of such design that, when the wheel turns, it always rests on the ground by means of two or three of these blocks.

With these rims the tractor surmounts very easily the trunks of trees or similar obstacles, and turns easily in a circle of sufficiently small diameter. The rim is, above all, very easy to mount, or demount, and likewise to repair. It does not have any long bolts which are so easily bent.

Towing Tests.

Outside of the trials indicated herewith, we had occasion to assist at some tests given at Puteaux May 6 and 8, 1914, over grades varying from eight to 19 in 100.

Direct Towing on a Grade.—The train, composed of a tractor weighing a total of 15,010 kilograms, ascended the Rue de Colombes at Puteaux, which presented a grade as steep as that of the Rue Gambetta, 11 to the 100. The same tractor, hauling a truck weighing 3700 kilograms, ascended at Puteaux, to the top of the Rue Brazza, which presented a grade of 19 to the 100.

Electrical Differential.—In the Balachowsky & Caire tractor the ordinary mechanical differential is replaced by an electrical differential, which has no mechanical components. The apparatus is very successful, as it will still remain operative with two wheels at diagonal corners raised from the ground, or the two opposite diagonal wheels may be raised from the ground. We have also seen the tractor in operation with the front axle completely raised and the right rear wheel not touching the ground. This latter circumstance may possess merely a speculative interest, except in very rare cases, but it is one of the characteristic properties of the electrical differential.

NEW MODEL MODERN TRUCKS.

Two new models are announced by the Bowling Green Motor Car Company, Bowling Green, O., maker of Modern wagons and trucks, which will be specialized for the coming year. These will be practically identical in design and will have capacities of 1500 and 3000 pounds respectively. The machines will be constructed of parts produced by well known specialists, and will be equipped with Continental motors, Bosch magnetos, Pierce governors, Brown-Lipe-Chapin Gear Company's transmission gearsets, and Timken front and rear axles.

NATIONAL AUTOMOBILE SHOWS.

National automobile shows will take place Jan. 2-9 at the Grand Central Palace, New York City, and at the Coliseum and the First Regiment Armory, Chicago, Jan. 23-30, according to the announcement of the National Automobile Chamber of Commerce. No statement is made with reference to exhibitions of service vehicles, and there is probability that there will be some display of these machines in connection with passenger cars.

A. F. Jones and A. A. Richards have incorporated the Klingensmith Electric Truck Company at Portland, Me., with capital of \$500,000, to manufacture electric trucks.

The Milwaukee branch of the Goodyear Tire & Rubber Company is now managed by G. H. Barmore, who was formerly a travelling representative for the company.

IMPORTS AND EXPORTS.

National Balance of \$653,000,000 in Total Foreign Trade of \$4,279,000,000.

A balance of \$653,000,000 in a total foreign trade of \$4,279,000,000 is the result of our commercial dealings with other nations, according to the summary contained in the annual report on commerce and navigation of the United States for the fiscal year of 1913, made by the bureau of foreign and domestic commerce of the national Department of Commerce. An indication of the progress of the United States industrially is shown by comparing the reports of a half century ago, when the imports of manufactures were five times the volume of the exports, with that of 1913, when the exports of manufactures were six times the volume of the imports. Manufactured goods have largely replaced agricultural products and raw materials (except cotton) as the greatest factor of exportation. Comparisons show that while in 1850 70 per cent. of foreign commerce was carried in American vessels, in 1913 but 20 per cent. of the foreign trade was transported by American ships.

The statement of commerce handled at the different ports of the United States is of material interest from the fact that it contains the final statistical exhibit of trade at these individual points of entry, many of which, because of the reorganization that became effective July 1, 1913, are now included in customs districts that bear general titles. More than anything else is emphasized the remarkable progression of the southern ports. New York City is the largest port in total commerce, having handled approximately \$2,000,000,000. Galveston, Tex., is second, with \$290,000,000, New Orleans is third, with \$252,000,000, Boston is fourth, with \$216,000,000, Philadelphia fifth, with \$170,000,000, Baltimore sixth, with \$150,000,000, San Francisco seventh, with \$130,000,000, Puget Sound ports eight, with \$114,000,000, Buffalo ninth, with \$81,000,000, and Detroit 10th, with \$71,000,000.

The customs revenues for 1913 aggregated \$313,000,000, and particulars regarding more than 3000 classes, varying in importance from such great groups as cotton laces, embroideries, etc., which yielded \$22,000,000 in duties, to snow shoes that paid \$633 in duties, are presented in tabulations, showing quantities, values, rates of duty and, in some cases, countries of origin. The volume also contains much other valuable information relative to trade with the world. It may be procured from the superintendent of documents, government printing office, Washington, D. C., for \$1 a copy.

The Remington Motor Company has been incorporated at Newark, N. J., with capital of \$500,000 by W. E. Robinson, H. Herford, D. B. Turner, J. Leichman and C. A. Stahl, to engage in the manufacture of engines, motors, machinery, etc.

KEEPS TRADE WITH TRUCK.

Chinese Market Gardener at Phoenix, Ariz., Leads His White Competitors.

When Ong Yee Len established himself on a tract of land a few miles distant from Phoenix, Ariz., and began to cultivate it, he was regarded sympathetically by the citizens, who wondered what the result of his ambitious, but evidently misdirected endeavors, would be. Ong Yee Len worked and confided in no one. Few knew that the thrifty Celestial was laboring to transform his acres into productive land, and because his crops of vegetables and fruits could not be sold to advantage on the farm, he began to bring them to Phoenix and disposed of them to the stores and markets.

Quickly realizing that were he to sell direct, instead of to the stores, he would make the profit that the middlemen took, he sought to deal with the people generally, and then he established a route of patrons that he served regularly. Ong Yee Len made his trips between the city and the farm with a pony and a wagon, but as his trade increased and the loads became heavier and the distances longer, and the work about the farm for the pony was proportionately greater, the only alternative was another pony. And even with this there was the necessity of meeting the competition of other farmers who offered their stock to Len's customers with the hope of attracting their patronage.

In other words, he had to consider the farm and haulage work and the service of his patrons, who were governed largely in their purchasing by the opportunity they had for selecting the vegetables and fruits when they required them. Quality and freshness were important factors, but delivery was equally cogent. Ong Yee Len worked through the spring of this year and cultivated a greater area than ever. Then he bought a Willys-Utility delivery wagon, and when his first crop was ready for the market he appeared to his cus-

tomers with the machine, easily in advance of his competitors, and prepared to extend his route to whatever length was necessary. Not only this, with the motor wagon he could supply different stores, as well as serve all his customers, and he was prepared to make whatever additional trips were necessary to meet the demand. Ong Yee Len is known as one of the most prosperous Chinese in Arizona, and the reason is that he has applied Caucasian business methods with the undoubted thrift of his race.

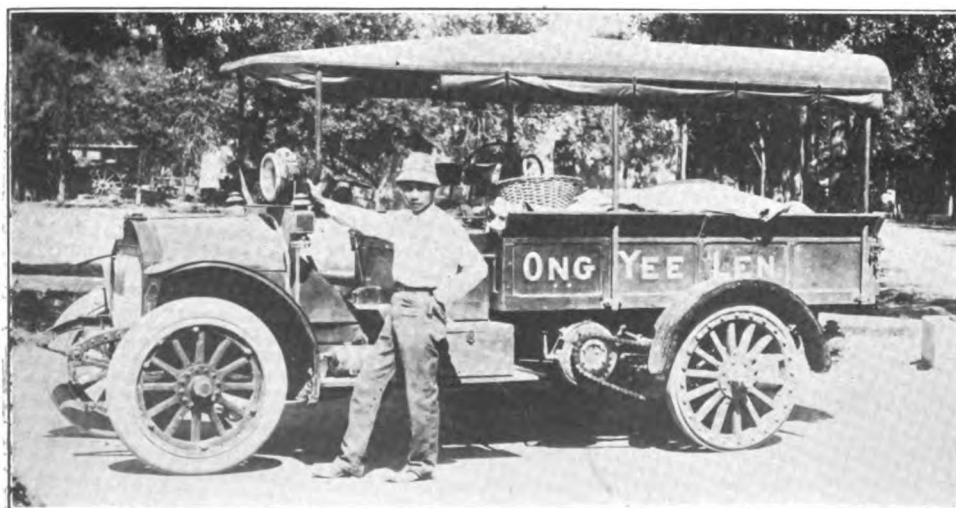
THOMAS H. WHITE DEAD.

Thomas H. White, who was until late in May actively engaged as head of the White Sewing Machine Company, Cleveland, O., died at his home there June 22. He was one of the pioneer manufacturers of sewing machines, and was directly interested in the motor vehicle industry until the White company took over the motor vehicle manufacturing business of the former concern. Of his four sons, Windsor T., Rollin H., Walter C., and Clarence G. White, Windsor T. is president of the White company, and Walter C. White is its sales manager. Both of these gentlemen are widely known and have been prominent in the motor vehicle industry for years.

Thomas H. White was an exceedingly wealthy man and his property is so disposed of that eventually a considerable portion of it will be devoted to charitable and philanthropic purposes.

HAUL 20 TONS OF GOLD.

Eight motor trucks were loaded with 20 tons of gold, which was hauled through the streets of New York City June 21, this probably being the largest amount of real money that has ever been transported at one time in the Metropolis. The preparations for the delivery were carefully made. The cash was in wooden cases and was received over the Lehigh Valley railroad by the United States Express Company and delivered at the Liberty street ferry, where the motor trucks were in readiness to transfer it to the United States sub-treasury in Wall street. The trucks were guarded by armed men and the trips from the ferry to the sub-treasury were quickly made. Few people, possibly none of the entire population of the Metropolis aside from those actually engaged in the transfer work, knew of the haulage of the precious metal through the business section of the city, and there was not a ripple of excitement.



Willys-Utility 1500-Pound Wagon Used by Ong Yee Len, a Chinese Market Gardener of Phoenix, Ariz., to Supply His Customers.

ELECTRIC VEHICLE PRACTISE.

The Conditions Usually Met With in the Preparation of Garage and Charging Facilities— Types of Apparatus and Instruments Necessary for the Protection of the Cells and Indication of Current Used in General Service.

By William W. Scott.

BATTERY charging as described in the preceding installments, has been discussed with the assumption that practical charging facilities have always been available. The reader understands that current, unless generated at a private plant, is supplied from a central station. The price charged for such service is on the basis of watts, the rate generally being fixed for kilowatt-hours, which means that for each kilowatt-hour current equal to 1000 watts has been furnished for one hour. A horsepower is equal to 746 watts, so that a kilowatt-hour is practically one and a third electric horsepower furnished for an hour.

When current is generated it is either direct or alternating, and the latter is the more generally used for public service and commercial purposes. When current is produced by the isolated plant it is usually of the character that will best serve the purposes of the owner, and adaptations may be made without reference to outside conditions, but when supplied by the central station the consumer must be governed by the current that is supplied by the main lines, as the commercial circuits are termed. From these circuits "feed wires" are extended to locations that are best suited for the installation.

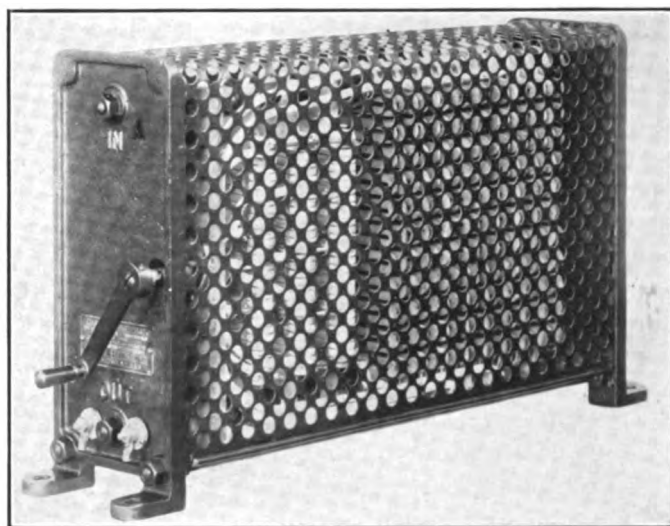
The current of the main line may be either direct or alternating. A direct current flows in one direction only, but the alternating current, as the term implies, flows in either direction at regular intervals. With the alternating current a terminal is alternately positive and negative, so that there is no continuity of the current pressure and consequently no charging influence. An alternating current must be converted or rectified to a direct current before it can be used for charging purposes.

The current of the main line is maintained at a constant voltage and amperage, and the only possibility of variance is through line resistance lessening the voltage slightly, and this increases with the distance between the power station and the charging point. This resistance is also constant and can be computed very accurately. But in any event there is the line resistance to be added to the battery resistance, so that there will be some drop in the voltage as sent out from the central station and when indicated at a charging panel.

Direct current may be available at 110 to 125 and 220 to 250 volts, 220 to 250 volts only, and 500 to 600 volts only. Alternating current may be available at 110 and 220 volts, or at any other voltage that may be

desired, and the matter of number of phases and frequency of the cycles need not be given any concern, though it must be understood that the equipment must be of a type that will conform to the form of current that can be utilized. There are factors, however, that ought to be definitely known before an installation is considered, for economy of current can only be obtained through equipment that is suited for the purpose required.

To illustrate, it is necessary to know whether the current is alternating or direct; if alternating, the frequency of the cycles and the number of the phases; the kilowatt-hour rates if both direct and alternating are available; the voltages available with either form

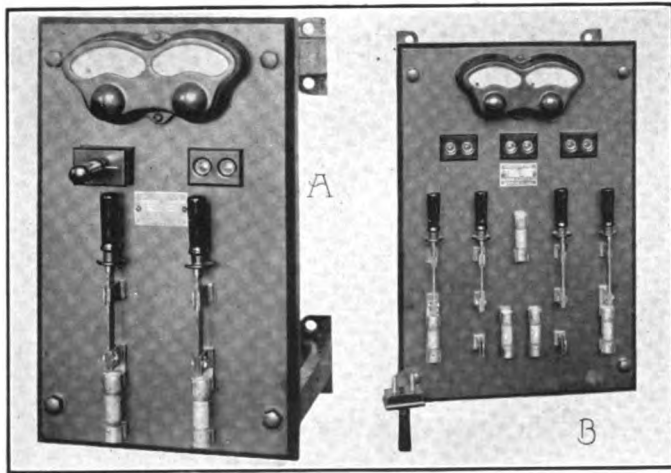


Standard Type Battery Charging Rheostat.

of current; the approximate percentage of fluctuations in voltage with either form of current; if charging operators are on duty day or night or continuously; the number of batteries, the number of cells of each battery and the charging rates of each battery. With these details a practical electrical engineer can determine the character of the equipment that will be most efficient and economical, and which can be readily expanded should occasion require.

It would be possible to charge a battery direct from a main line with no other apparatus than a water rheostat, but this would require constant observation and uncertain adjustment, while with instruments for indicating the current and precisely controlling it positive results can always be obtained.

Assuming that a battery is to be charged from com-



Private Garage Type Battery Charging Panel: A, Single-Circuit; B, Two-Circuit, for Wall Mounting.

plete exhaustion the increase of the voltage necessary at the start will vary from 16 to 19 per cent., and this will be automatic as the charging continues, until the amperage is reduced to the rate designated. The starting rate of a 12-cell battery will be 26 volts, to illustrate, and when this voltage has increased to 31 the amperage will be to the point specified for the cells composing it, and a 50-cell battery will be started with an initial voltage of 110, and when this has increased to 128 the amperage will be similarly reduced.

It will be understood that the function of a rheostat is to reduce the voltage of the current received from the main line to the value that is required for the battery, for otherwise the full line voltage would be taken by the battery, and the result would be generally destructive. The rheostat is in effect a large resistance coil, the efficiency of which can be varied by increasing or diminishing the amount of resistance that the current is required to pass through. The effect of current absorbed by a rheostat is to generate heat, and the electric energy between the voltage of the supply line and the indication of the voltmeter, measured by volts, is wasted.

The ideal service would be to supply the exact voltage necessary when charging was begun, and to increase this as the charge progressed, but this is not possible, and for that reason the line voltage in excess of the initial requirement must be taken up and cannot be utilized. Where the batteries are small and the excess of line voltage over the maximum charging requirements is considerable, the current actually used for charging may be much more than is represented by the current stored in the battery. The energy is lost in the rheostat.

Pleasure car batteries are generally much smaller than those used in wagons or trucks and the maximum voltage may appear comparatively small when contrasted with truck batteries, as, for instance, 30 cells of one type against 44 of a type having from 50 to 75 per cent. greater capacity. The charging of such batteries requires equipment that will consume less current. Some of the best equipped garages have two current mains and two bus bars with which charging connec-

tion is made. One of these may have a maximum voltage of 80 and the other a maximum of 120. This will afford charging of the large and comparatively small vehicle with voltage very little in excess of normal demands, and the waste of current will be minimized.

The stations where such provision is made are, however, comparatively few, and, as a rule, one supply main is regarded as sufficient. Where there is but one source of current supply the voltage is kept as low as is practicable above the maximum charging voltage of the largest battery used. This statement applies to stations of some proportions, but the smaller stations and the private garages must of necessity make use of whatever current can be obtained and accept the loss of excess current as a condition that cannot be controlled.

The conditions in which charging is to be done necessitate mature consideration, for a private garage in which one or more pleasure cars are stored is a much different proposition than that in which several delivery wagons or trucks are kept. In the first instance, minimum expense is not material and convenience and large area are factors that will appeal to an owner, but in the second economy is of decided importance and yet there ought to be every necessary facility for upkeep and maintenance. With the small public station that has a limited business, and yet a reasonable promise of development, the facilities ought to be adequate for all ordinary requirements, the equipment should be high class to insure a relatively small maintenance cost, and the arrangement should be such that minimum floor space should be used.

The large public garage must have provision to give the best of attention to its customers, and an enterprise of this character should be equipped to meet any condition that may arise. The department store or the concern doing a large transportation business must have a garage that will insure the largest measure of efficient operation and the maintenance must be consistent with the equipment owned.

Whatever the requirements, it is well to have the advice of a man of experience, who can study the conditions and determine what will best serve to obtain economy and efficiency. The owner who decides problems without understanding them, or who accepts the suggestions of one who has not practical knowledge, may find that serious error has been made, that cannot be corrected without material change at more or less expense.

For charging vehicles of small battery capacity and few in number, battery charging rheostats and distributing panels will serve very well. These are made in different types. Considering the rheostats first: These vary materially in construction. Those that are designed to charge batteries at maximum rates, until maximum voltage is reached, and finish at the minimum voltage, have less resistance than those designed to start the charge at the minimum voltage, and con-

sequently cost less. Rheostats intended for use with currents in excess of 115 volts are built with greater resistance and are more expensive, and as a rule are built to specification, because they are not used unless arbitrary conditions require them. Not only this, but rheostats are built for specific charging requirement, for light pleasure cars only, for heavy pleasure cars, delivery wagons and the like, and for any type of electric vehicle, while others are made especially for use with Edison batteries, where the amperage may be extreme. Rheostats are built for wall mounting or installing in front of a switchboard, for the back of a switchboard, for assembling in banks, and others are equipped with protective devices to insure batteries against damage from abnormal current conditions or carelessness by the operators in charge. From this statement it will be understood that manufacturers of electrical apparatus have made provision to meet many conditions and that these conditions require widely differing equipment.

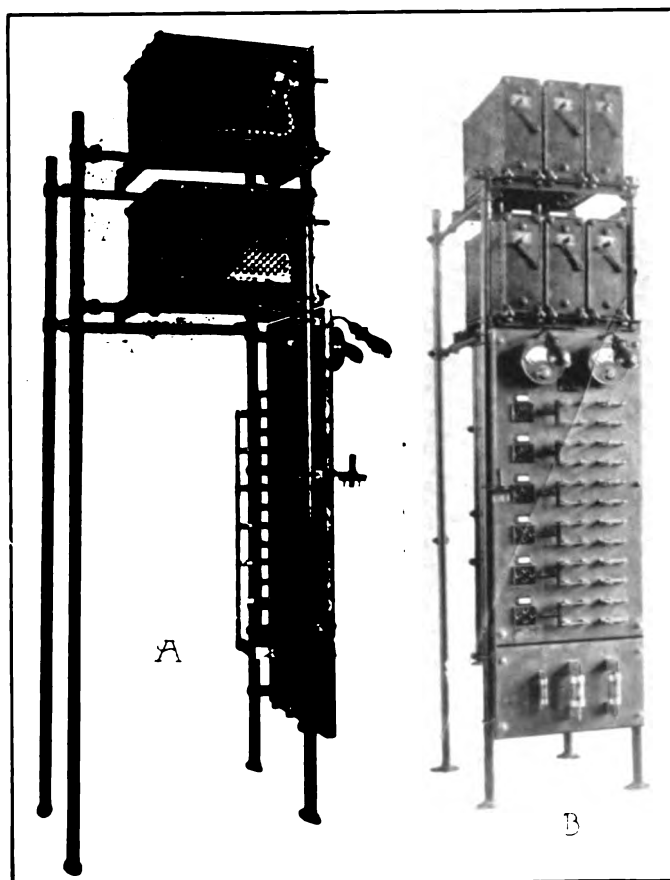
Rheostats are constructed to charge varying numbers of cells in series, from a minimum to a maximum number, from a minimum to a maximum amperage, with specified maximum resistance in ohms, with a definite number of steps or graduations by which the degree of resistance may be fixed. The grids are generally enclosed in a cage or ventilated frame to allow radiation of the heat and to prevent accident or injury from contact with it. On the frame is a movable arm that swings and in swinging contacts with contact points that connect the different sections, so that a greater or lesser degree of resistance may be brought into the circuit.

Battery charging or distributing panels are usually built with a metal frame, carrying several sections of slate or marble, on which are mounted the fittings and instruments incorporated with each. These panels vary in equipment, but those that are designed for every practical purpose and to afford the greatest utility, include the binding posts or terminals, a double-throw switch and fuses, the contact segment and operating lever or arm, by which the charging current is regulated, a volt-ammeter, and, if protective devices are included, these consist of a maximum voltage cut-out, which automatically opens the circuit if the current drops to a predetermined minimum, preventing the battery discharging into the line should the voltage drop below that of the battery; a maximum voltage cut-out that automatically opens the circuit when the battery voltage reaches the point at which the cut-out is set to operate; a solenoid switch which will open and "break" or close and "make" the main line charging circuit, and an overload circuit breaker, which will automatically open the circuit if the charging current rises to the point at which it is set to operate. Such a panel as this protects the battery in all conditions of charging, preventing an excessive charging current, and prevents the battery "reversing" should the line voltage fall. With it a battery may be left to charge with a certainty that it will automatically cut off the

current when the maximum voltage is reached. These panels are also provided with an electrical interlock for the operating lever, which prevents the operator closing the circuit to the battery except when the lever is in the "off" position, with all the resistance in circuit. When specified such panels are constructed without the volt-ammeter.

For use with motor generator sets, charging panels are made even more complete, these being equipped with a volt-ammeter, a starting rheostat for starting the motor, a field rheostat for varying the voltage of the charging current supplied by the generator, two knife switches, the one to the motor circuit and the other to the generator circuit, and the protective devices that have been stated above. Aside from this type of panel all are designed for use with direct current.

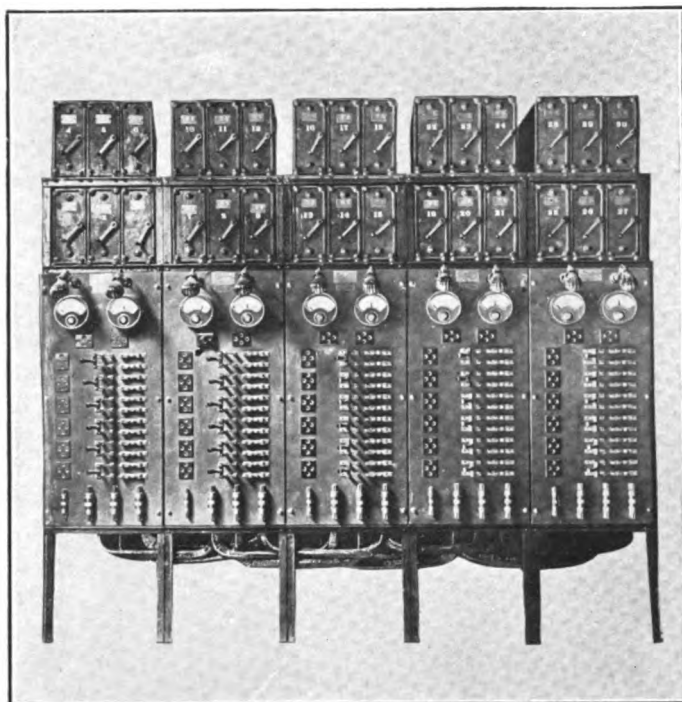
For larger installations, what are known as charging panels, that are intended for installation in garages where more than one vehicle are stored, and which have such construction that they can be connected to make a board of large proportions, are built. These are usually designed to afford six charging circuits, so that six vehicles at a time can be charged, six being a convenient number of circuits that can be connected and operated. The rheostat or charging panel for the single vehicle may be located on a wall, where it will always be accessible and yet not occupy floor space, and where it will not be dangerous to those



Six-Circuit 110-Volt Standard Battery Charging Panel, Two-Wire, 360 Ampere Maximum: A, Side View, Showing Standard and Resistance; B, Front View.

working in the garage. The larger or floor panels are mounted on frames secured to the flooring or to a wall, and these usually carry a separate voltmeter and an ammeter, six double-throw knife switches, and the usual protective devices, the resistance or rheostat for each circuit being placed either behind or above, or, in some instances, in galleries where they may be reached by a hooked pole.

The general arrangement of the switchboard is much the same with panels of this character, the main difference being in the construction of the frame, which are designed for varying installations of the rheostats. The panels are generally built for use with direct current, for where alternating current is supplied a motor-generator set is necessary, which calls for special equipment, and the requirements are so varied that panels for such service are constructed specially, generally to specification.



Type of Switchboard Adapted for Public Garage Service, Fitted with Battery Charging Rheostats.

The six-circuit floor panels are generally built to standard specifications, the intention being to produce what will afford uniform service and to obtain the advantage of standardization in manufacturing. Panels of two and four circuits are manufactured, and these are standardized as a rule, but are not so satisfactory installations, for they are not as adaptable for expansion. The smaller panels are usually located on walls, but the floor panels or switchboard sections are so placed that every part is fully accessible and can be worked on almost instantly. The value of accessibility needs no further emphasis.

Charging panels of six circuits are usually built in two types, known as moderate and heavy duty capacities, and as the panels are not constructed with in-connections, the common practise is to install common bus bars, generally beneath the floors, from which

cables are extended to the different circuit connections of the panels. For this reason a construction that is favored is the installation of such bus bars as will afford means of expansion when this becomes desirable, which obviates changes and material expense later on.

With reference to the uses of these panels the moderate capacity type is intended for installation where the charging current of any individual circuit does not exceed 60 amperes, and the heavy duty panels are for circuits where heavy overloads are necessary and the amperage may range from 100 to 200 for a single circuit. The latter type of panels are built with larger rheostats and can be utilized for "boosting", where for short periods the amperage may be very high, or with Edison batteries, which are charged with large amperage in the event of need.

The equipment of the panels differs with the character of the installation, and may include varying protective devices or fuses that will prevent damage to the batteries by excessive current. Each of the circuits is controlled by a double-pole, double-throw switch, which, when opened, protects both sides of the circuit from the source of supply. The right side of the switches is the usual charging side, and is furnished with enclosed fuses for the protection of the circuits should trouble develop with the batteries, rheostats or connecting leads, and the left side is connected with the ammeter bus, so that the charging current on any circuit may be read on the ammeter when the switch is thrown in that direction.

The current can be indicated through only one circuit at a time, but the ammeter is protected by an individual fuse mounted on the back of the panel in the event that two or more switches should be thrown to the left side simultaneously, and to prevent possible trouble in the individual circuits during the time the reading of the circuit is being made. In addition, potential receptacles and the necessary plug, with holder, are furnished so that the voltage of the source of supply can be read on the voltmeter, and the voltage can be applied to any of the batteries outside the charging rheostat. As but one plug is provided, there is no possibility of an operator making a short circuit on the potential bus bar.

Another type of panel is built in two sections, which are mounted on a frame side by side, at the right there being three double rows of contact buttons and at the left two rows, between these rows there being a horizontal rod on which is a contact slide that is moved from side to side, affording the maximum and minimum of resistance stops. The left panel in addition carries a voltmeter, an ammeter, a field rheostat and a main line knife switch, this being necessary when used with a motor generator set. The reading of any of the five circuits is taken by the ammeter by cutting in the desired circuit by a circuit switch. With this type of panel the resistance is mounted behind the panels, where it is convenient for access. When such a panel is fitted with a reversing switch it may be used for discharging a battery, which is a very desirable

facility when work is to be done that will need special treatment of the cells.

Obviously types of charging panels cannot be described in detail, and those that have been specified are such as are in general use. The reader will understand that panels may be greatly varied as to detail, but those referred to have practically all the equipment that will be necessary to obtain efficient and satisfactory results.

It may be well to emphasize that where direct current may be obtained from a central station at approximately 110 volts two-wire, or 110-220 three-wire, batteries may be charged directly through charging rheostats, but where the voltage is 220 volts direct, or more, a motor generator set should be used to deliver the lower voltage required for the battery, as the use of the charging rheostat alone would necessitate an unnecessary expense for power taken and lost through resistance. The current generally supplied by central stations is alternating, and this may be converted to direct current by the use of motor-generator sets or by rectification. But in any event charging rheostats and switchboards are necessary.

(To Be Continued.)

LONGUMARE ENJOINED.

Judge Hand of the United States District Court for the southern district of New York, has granted an application for a preliminary injunction against Ludwig Arnson and Alfred Michaelis, doing business as the Longumare Carburetor Company, upon the affidavit of Charles W. Stiger in behalf of the Stromberg Motor Devices Company, which restrains the defendants from further alleged infringing the Richard and Ahara patents pending the settlement of the case upon its merits.

UNITED STATES RUBBER DIVIDEND.

A quarterly dividend of two per cent. on first preferred stock and of $1\frac{1}{2}$ per cent. on second preferred and common stock, has been declared by the directors of the United States Rubber Company, to stockholders of record at 3 p. m., July 15, payable without closing the transfer books July 21.

A quarterly dividend of $1\frac{1}{2}$ per cent. on the six per cent. preferred stock, and a dividend of $1\frac{3}{4}$ per cent. on the seven per cent. second preferred stock was paid July 1 to stockholders of the Kelly-Springfield Tire Company.

The plant of the Frantz Body Company, Akron, O., has been purchased by the Miller Rubber Company, and the buildings will be demolished and replaced by a large factory, and a new warehouse will be erected back of the present building.

TRANSCONTINENTAL TRAIL.

Bessemer Truck Blazing Way from Grove City, Penn., to Spokane.

A one-ton Bessemer truck was sent away May 15 from the factory of the Bessemer Motor Truck Company, Grove City, Penn., on what will undoubtedly prove to be the longest and probably one of the most difficult drives ever undertaken in America. The truck is a stock construction and was not specially prepared for the work.

It was loaded with 2600 pounds of paint, and as this material is used it will be replaced, so that the machine will probably have a capacity freight the entire distance. It was in charge of A. L. Meigs, who is connected with the Automobile Trail Blazing Association of Minneapolis, and expected to drive it through to the Pacific Coast.

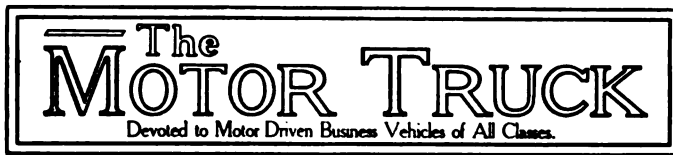
The route as determined was from Grove City, Pittsburg, Harrisburg, York, Lancaster, Philadelphia, Penn.; Trenton, N. J.; New York City, Poughkeepsie, Albany, Utica, Syracuse, Rochester, Buffalo, N. Y.; Erie, Penn.; Cleveland, Toledo, O.; South Bend, Ind.; Chicago, Ill.; Minneapolis, Minn.; Fargo, Bismarck, Mandan, N. D.; Livingston, Butte, Missoula, Mont.; Spokane and Seattle. A considerable time will be required for the drive, for work is done in connection with it. For instance, 15 days were taken for the trip from Grove City to New York, and after leaving there the progress was relatively slow.

On arriving at Minneapolis the machine will be used in that city and vicinity until it is started westward. The purpose of the association is to plainly designate routes and trails that are practical for motor vehicle travel, and so well pleased was Mr. Meigs with his experience with the machine that he ordered three more, which will be used by the association in similar work. These will be delivered at different points to be designated as the machines are ready.

The Pullau Steel Spring Company has been organized at Mount Clemens, Mich., with A. T. Donaldson as president, A. J. Pullau vice president, and Clifton D. Jackson secretary and treasurer, to manufacture springs. The company has capital of \$75,000 and it is building a one-story building 175 by 74 feet.

The capital stock of the Kelly-Springfield Tire Company has been increased from \$5,149,500 to \$10,299,000, being divided into \$4,239,200 six per cent. cumulative preferred stock, \$1,029,000 seven per cent. second preferred stock, and \$5,029,000 common stock.

The American Taximeter Company, New York City, which manufactures taximeters and recordographs, has begun the production of a hub mileage recorder, known as the Transimeter, which is intended for use of freight carrying vehicles.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

TRUCK BUILDERS' CONGRESS.

A convention of manufacturers of motor wagons and trucks will be organized by the Automobile Chamber of Commerce to take place in October, in all probability, for the purpose of reaching determinations of numerous subjects of great importance to them. This division of the industry has been partly represented by the commercial vehicle department of the only representative organization, and while the work accomplished has been in a sense satisfactory, there is realization that eventually the production of freight and passenger vehicles will be much the larger and the interests of these builders will predominate.

Without standardization, so far as this may be possible, and the harmonizing of policies and endeavors, the progression of the industry will be materially retarded, and the convention will be planned with the purpose of obtaining every practical benefit. In this convention the people as a whole will be deeply concerned, and much will depend upon the preparations made and the policies decided upon.

MOTOR FIRE APPARATUS.

The conflagration at Salem, Mass., was the largest the country has known since motorized fire apparatus has been recognized as standard equipment, and the utility and efficiency of the machines were better demonstrated in this disaster than would be

possible with any form of test. Salem owns but one motor apparatus, but when assistance was required and cities and towns for a radius of a score of miles were notified, the machines were rushed over the road, and during the progress of the fire more than 30 different units of motorized equipment were in service, to say nothing of horse drawn apparatuses.

No man not trained in fire prevention and protection is qualified to judge the comparative qualities of department equipment, but the men with experience, they who direct the fire departments of surrounding towns and cities, do not hesitate to say that without exception the motorized apparatus was proven to be all that could be desired. A series of conditions, entirely beyond the control of the firemen, were very largely responsible for the spread of the fire. Practically without water, the apparatus was well nigh useless.

In some instances the motor pumps were subjected to extreme tests, one of them being constantly in service for 17 hours and 30 minutes, and another for 16 hours and 45 minutes, and they were worked to capacity because of the extraordinary need. The motor apparatus was driven long distances in some instances and at fast speed, and an average of 30 miles an hour was made by some of the machines for runs of from 10 to 23 miles. Several towns and cities sent steam pumps over the road attached to motor trucks, for railroad transportation was almost impossible, and time was the greatest value.

GOVERNOR WALSH'S GALLERY PLAY.

Governor Walsh of Massachusetts, directly after the visit of a committee that represented the owners of more than 7000 freight vehicles, signed the bill passed by the legislature materially increasing the registration tax on trucks. The committee conferred with him at his invitation. He had assured the members of numerous organizations of motor vehicle owners that he would veto any legislation that was not equitable, and the assurance was given by him without solicitation. The committee went to him with facts that were prepared by those who proposed and favored the bill, that were indisputable and were positive in their application. His fairness was taken for granted. He informed the committee that he would be exceedingly careful in reaching a conclusion. He was well informed and he made a law that had been opposed for several years by every business man of Massachusetts. He imposed a tax on machines that was favored by the state highway commission, a body that has for years devised ways and means of maintaining the state roads at the expense of the cities, which he could have prevented by a veto. At least 70,000 machines are owned in Massachusetts. The owners are just now particularly interested in Governor Walsh. If he is again a candidate for governor they will be still more interested.

ARMY MOTOR TRUCK WIRELESS STATION.

WIRELESS telegraphic and telephonic communication will undoubtedly control the destinies of nations in conflicts of arms that are to come. The resources to communicate with commanders and issue instructions within the limitations of apparatus will afford a new aspect to warfare, and will necessitate another character of struggle between warring nations—for the control of the air so far as the transmission of information by wireless is concerned. The success of the Japanese in the war with Russia was due in no small part to the field telegraphic communication between the fronts and the different headquarters, but this was not wireless.

The United States has not so systematically developed telegraphy and telephony as have some of the European nations with reference to military purposes, but the commercial possibilities in America have prompted private development to such a degree that it may be said that the means of communicating by wireless are further advanced, and there is a national organization of owners of private stations that is indirectly controlled by the government, and may be utilized in the event of need.

The signal corps of the United States army is a body of specially trained men who have been educated to what will probably be the most important work that will be required for the defense of the nation, and in the event of warfare they would be attached in groups to the different units and expected to maintain communication with the different sections or divisions. Flags and lights are used for short distances, telegraph and telephony longer stages, and, in the absence of these, wireless apparatus. The value of the wireless is that it may be used at any time and in almost any conditions, and there is little probability of communication being prevented.

The United States signal corps has now available a portable wireless station that may be located wherever desired and in a remarkably brief space of time be fully operative. This is primarily a White chassis, specially equipped for the service, that can be transformed to a receiving or sending station in 12 minutes, and messages can be sent to or received from points within a radius of 800 miles, provided that conditions are favorable. By this is meant that electrical disturbances might vary the distance that efficient operation can be maintained.

The truck chassis itself does not differ greatly from

those that are in general use, but its equipment is especially interesting. The body is an enclosed type, with a substantial roof carried on sturdy stanchions, with the forward end partly enclosed. The driver's cab is conventional. The sides of the body may be protected by curtains in the event of storm.

Were not long boxes installed on either side of the body above the mudguards and running boards the machine would not attract attention. These boxes have covers that raise against the sides. There is a wide end gate and a rear step, and at the sides at the rear of the body are seats that will serve for two men each. The forward end of the body is fitted as a wireless station, there being a small table at the right side for the operator, and the partitions at the sides and end are utilized for the different instruments.

Mast in Nine Sections.

The power plant of the chassis is coupled with a train of gears so that it may be operated to drive a powerful generator, this furnishing the current that is used when the station is in operation. At the rear end of the canopy of the body is a platform on which may be erected a series of struts which are used with a block tackle for erecting the mast. The mast is in nine sections, jointed as is a fishing rod, which, when joined, has a height of 85 feet. The upper section is raised by hand, and then this is raised by the tackle and each lower section fitted in turn until fully jointed. Wire guys attached to the fifth section are used to support the mast. The crew has been trained to erect or dismount the mast until the work is done with great rapidity. As might be assumed, the mast is raised directly behind the rear end of the chassis.

At the top of the mast are the antennae which are umbrella type, and the counterpoise, or artificial ground, consists of heavy insulated wires that radiate from a common centre, to which is attached the



United States Army Signal Corps Motor Truck Wireless Station: At Left, the Interior Equipment of a Special Body on a White Chassis; at Right, Crew Erecting an 85-Foot Sectional Mast Carried on the Machine.

ground wire of the wireless set. For convenience in grounding there is a socket on the outside of the truck body, into which a ground-wire plug is fitted.

Voltage of 90,000 from Generator.

The generator is designed to afford an electric current of 500 cycles at 110 volts and with a pressure from 18 to 32 amperes. This current is transformed and intensified until it leaves the side of the truck with a voltage of 22,000, and an amperage of from eight to 12, and as the current reaches the top of the antennae it is increased to a voltage of 90,000 and the amperage decreases to approximately zero. The radiation is such that in the worst of conditions the station can project signals 200 miles with certainty, while in the early hours of the morning, when there is less electrical disturbances from differing sources, the range may be as much as 800 miles.

The machine and its equipment have been designed for hard service and the speed is relatively higher than might be expected, because of the unusual service for which it was constructed. The crew is varied with the requirements. Numerous tests have been made with the station, the results being especially satisfactory to the officers directing them. It was in use last month at the practise encampment of heavy artillery at Tobyhanna, Penn., where the field guns were fired over a mountain at targets on the other side, being used to send and receive messages from Washington. In tests that were made at Washington messages were received from Boston, Brooklyn, Key West, Porto Rico and ships at sea, and at one time the operators took up the communication between the Arlington, Va., and the Honolulu stations, this being over a distance of upwards of 5000 miles.

This machine is now in readiness for any form of service, and it has proven so practical and the possibilities are so great that there is probability of a number of these portable stations being built as a preparation for the future and as a judicious military equipment.

The National Acme Manufacturing Company, Montreal, P. Q., is to manufacture the Bigsby spark plug in Canada under the management of P. F. Melinger. The Bigsby plug is made in the United States by the Bigsby Manufacturing Company, Cleveland, O., and during a recent visit of President C. S. Bigsby to Canada the arrangement was consummated.

The truck department of the Buffalo Electric Vehicle Company, Buffalo, N. Y., has been placed in charge of F. C. Brown, who was connected for a considerable length of time with the Chase Motor Truck Company, Syracuse, N. Y., as district manager.

William Lehman, who was associated with the Commerce Motor Truck Company as manager of production, is now a special representative of the Grant Motor Company.

ARMY TRUCKS BOUGHT.

Nine Manufacturers Share in the Blanket Contract of War Department.

The quartermaster-general's department of the United States army will shortly have 20 light trucks at its disposal, for Secretary of War Garrison has approved the bids of nine different manufacturers, from whom the machines will be purchased. The majority of the machines, and possibly all of them, will be delivered at Fort Sam Houston, Tex., which has been the mobilization point of the army serving along the Mexican border.

Bids were invited from the industry generally for differing types of machines and these were submitted at several places, including the headquarters of the quartermaster-general's department at El Paso, Tex., as well as Washington. The department required machines of approximately 3000 pounds capacity and the bidders as a rule submitted terms for these types of machines.

The bids accepted were as follows:

Velle Motor Vehicle Company, Moline, Ill.....	5
White Company, Cleveland, O.....	4
Lippard-Stewart Motor Car Company, Buffalo, N. Y.....	3
Thomas B. Jeffery Company, Kenosha, Wis.....	2
International Motor Company, New York City.....	2
Kelly-Springfield Motor Truck Company, Springfield, O.....	1
Driggs-Seabury Ordnance Corporation, Sharon, Penn.....	1
Lord Baltimore Motor Truck Company, Baltimore, Md.....	1
Federal Motor Truck Company, Detroit, Mich.....	1

The prices submitted in the bids differed considerably, as well as the time in which delivery could be made, and after consideration decision was reached to accept one or more machines from each bidder with a view of making comparison of service and determining which make and type best serve the purposes of the department. The chassis only have been purchased and these will be fitted with bodies designed by the engineers of the quartermaster-general's department. These will not be uniform, but will be for varying works. In a general sense the chassis conform to standard specifications of the department, but they are what may be regarded as conventional with the industry and none will be specially built for the prices paid.

The plant of the Balon Steel Company, Charleston, W. Va., has been purchased by the Becker Steel Company, 90 West street, New York City, importer of German cobalt steel. A new company with capital of \$1,000,000 is being organized. The intention is to import steel billets from Germany and manufacture the metal to meet the requirements of the American trade.

The production of bronze die castings has been begun by the American Metal Products Company at Milwaukee, Wis., in a part of the old plant of the Wambold Manufacturing Company.

S. A. E. MID-SUMMER MEETING AT CAPE MAY.

FROM the viewpoint of attendance, from direct interest and from the character of the deliberations, the semi-annual meeting of the Society of Automobile Engineers, held at the Hotel Cape May, Cape May, N. J., was the most satisfactory in the history of the organization. The attraction for the membership was the work of the society and its committees, and a realization of the practical benefits obtainable impelled the members to arrange to attend as many sessions as possible.

The social attractions in connection with the meeting were numerous and were very generally enjoyed. A considerable number of members were accompanied by their families, and the opportunities for amusement and recreation were made the most of by practically all the visitors.

The meeting was begun at 2 o'clock the afternoon of June 23 with a meeting of the standards committee, at which the following reports were received:

Ball and roller bearing division, progress report on reducing the number of stock sizes of roller bearings.

Broaches division, reports on four-spline practise and on castle nuts for use with taper fittings.

Electrical equipment division, reports on temperature test of insulation material, and recommendation of single-wire system.

Electric vehicle division, progress report on work to be undertaken, and reference of the work to sub-committees.

Iron and steel division, reports on the reduction in number and modification of S. A. E. steel specifications, and the physical properties of S. A. E. steels.

Lock washer division, communication from the chairman.

Motor testing division, report on forms for recording performances and details of internal combustion motors and their accessories, and a code for use in connection with the forms.

Miscellaneous division, reports on spark plug shell, fit in tapped hole, rod and yoke end pins, license pads, gasoline specifications, lubricating oil and extension of S. A. E. standard threads for dimensions beyond 1½ inches diameter.

Pleasure car wheels division, report on routine tests of pneumatic tire rims, recommendation of sizes for pneumatic tires, report on the difficulty of modifying to common basis cross sections of various types of demountable rims.

Research division, progress report on tests to determine proper tap drill sizes in various materials.

Standards exchange division, report on co-operation with the Automobile Engine Manufacturers Association, report on the outside diameter of flange and other points in connection with unit power plant transmission.

Truck standards division, communications received as to industrial truck wheel sizes.

The consideration of the reports and the communications occupied the entire afternoon and was productive of much discussion and decided interest.

In the evening a meeting of the boards of governors of the different sections took place at which differing subjects were disposed of.

The business session was begun the afternoon of the following day, June 24, at which President Henry M. Leland of Detroit made an address, in which he said in part:

To every man who has a real earnest desire to make the most of himself (if that is his aim he is an engineer) and to fill to the full the most important niche to which he may aspire in this world and the next, there is a free course and a fair field. It is great to be an engineer. It is greater to be a man—a great, broad, full-measured man. This is the great calling. This is the great engineering feat, and he who would attain it must—in all life's great problems, in his dealings with his fellows, in his treatment of those beneath him in rank, in his treatment of the weak and unfortunate, in his walk with his equals and superiors—cultivate personal qualities of justice and mercy, fair play and courtesy.

May I express the hope that you men, whose genius and application have in so short a time created from nothing the wonderful automobile industry, will give to the industry such an indelible stamp of personal integrity, uplift and character, that our industry shall forever stand as a type of the highest and best, as it is now the newest. With this clean manhood as the starting point, and equipped with our theoretical and practical training, we are well qualified to enter upon our work in life and become successful manufacturers or business men.

Perhaps more closely related to engineering interests is our standing and affiliations as engineers. It was my privilege in 1910 to be entertained, with some of you, by the Institute of Engineers of Great Britain, with a large party of the members of the American Society of Mechanical Engineers. In the summer of 1913 I again had the privilege of going with the same society when we were entertained by the German Engineering Society in 12 of the principal cities of Germany. We were most royally entertained, and the trip was from the beginning a revelation of the most interesting experiences for a mechanical engineer. One thing that impressed itself very strongly upon me was the greater, the better standing which the engineers of both Germany and England seem to have with their governments and communities, as compared with the conditions in our country.

The annual meeting of the German society, held in Leipzig last June, was called to order by the lord mayor, who made a very fine address. Different important members of the local government were in attendance and took part in the meeting. Members of the Reichstag were present, and the King of Bavaria graced the occasion with his presence, listening to the various papers and deliberations of the meeting. We were informed repeatedly that whenever the government had in contemplation any great engineering feat, or in fact, any engineering problem, the authorities having the matter in charge invariably went to the officers of the engineering society and counselled with them in reference to the project and the men whom they should choose to carry out the work.

In many other ways we saw unmistakable evidence of the better standing of the engineering profession in both these countries than we enjoy here in the United States. In casting that it may be due to the fact that in both these countries about for a reason for this state of things, it occurred to me all the various classifications of engineers are merged together in one great national engineering organization. I presume that each of the various organizations, such as those of the automobile engineers, the electrical engineers, the mechanical engineers, etc., have their own local divisions for conference and discussion. They are, however, all also interested in the great federation of engineers and meetings of this larger and gives far reaching and important dignity and standing to the profession, and I hope that measures will be taken in the not more important organization are held periodically. This distant future to have all engineering societies in the United States join in a like organization.

I have been asked to discuss the comparative efficiency of the engineers of either Germany or England and of the United States. I am not prepared to speak finally of this, although I was impressed with the thoroughness and conscientious achievements of the engineers in both the foreign countries mentioned. I believe that the American engineers are as a whole much farther advanced in efficiency and economical achievement than either the German or the English engineers.

The automobile engineers of America have the greatest reason to be proud of the progress and development of their profession in the very few years of its existence. History has nothing to record to compare with it. This progress would not have been possible except for the peculiar genius of our trained

young men, which enables them to think and act quickly and accurately.

Similarly, the members of the Society of Automobile Engineers have cause to feel pride in their organization which has so quickly and thoroughly shaped itself into the technical heart and head of the industry. It draws together in personal fellowship all members of the great family. It unitedly solves the problems which none alone could master.

Following the address came the report of the treasurer, the report of the tellers of the election of members, a discussion of a proposed constitutional amendment and consideration of new business.

The professional session was then begun by a report of the research division by Chairman David L. Gallup, the report of the iron and steel division by Chairman Henry Souther, and the report of the miscellaneous division by Chairman John G. Utz.

The evening was given over to entertainment by the "players" of the organization, which was of decided interest and unusually amusing.

The professional sessions began at 9:30 the morning of June 25, included a report of the pleasure car wheels division by Chairman Henry Souther, a paper on "S. M. M. T. Standard Rims" by E. R. Hall; a paper on the "Possibility and Difficulties of Formulating Acceptable Recommendations for One Standard Felloe Band for Wheels to Be Equipped with Pneumatic Tires", by C. C. Carlton; a paper on "A General Summary of the Truck Tire Situation", by J. E. Hale; a paper on "Starting, Lighting and Ignition Devices," by A. D. Libby, and a paper on "Electric Transmission for Motor Cars", by J. B. Entz.

The afternoon of the same day at 2 o'clock the session was continued with a discussion of "The Ideal Car", which was introduced by a short paper by C. E. Davis, and was participated in by E. T. Birdsall, Herbert Chase, Karl L. Herrmann, Robert McA. Lloyd and Joseph Tracy; a paper on "Correct Distribution of Material in Automobile Construction", by A. P. Brush; a paper on "Highest Quality Six-Cylinder Chassis for America", by A. Ludlow Clayden; a paper on "Tendency in European Car Construction", by R. W. A. Brewer; a paper on "Power and Performance of Gasoline Motor Trucks", by C. T. Myers; a report of the electrical equipment division by Chairman A. L. Riker, a report of the electric vehicle division by Chairman Arthur J. Slade, and a report of the broaches division by Chairman C. W. Spicer.

In the evening the annual banquet was enjoyed, and following this there was an illustrated talk by Orrel A. Parker, which was descriptive of the proposed European trip to be made by the members in October and November.

The final session took place Friday morning, June 26, at which time the programme included a paper on "Tap Drill Sizes and Causes of Stripped Threads", by H. E. Harris; a report of the motor testing division by Chairman J. O. Heinze; a report of the ball and roller bearings division by Chairman Howard Marmon; a paper on "Engineering Basis for Taxation of Motor Vehicles", by C. O. Egerton and S. I. Fekete, and a paper on "Characteristics of an Automobile Engine Lubricant", by Prof. David L. Gallup.

CLEVELAND'S TRAFFIC ORDINANCE.

The police of Cleveland, O., are busy educating the people of the city to the requirements of a new ordinance regulating traffic that is expected to bring about material improvement of the conditions in the business streets, as well as increasing the safety of the citizens generally. The ordinance requires the usual two front lamps and a tail lamp, with illumination of the registration number plate, and a red light on the rear end of a load that projects beyond the vehicle body; it defines a motor truck as a vehicle equipped with solid tires and constructed to carry freight; it limits the speed of a vehicle and load weighing eight tons or less to 12 miles, and of a vehicle and load in excess of eight tons to eight miles an hour, and prohibits the haulage of loads of more than 12 tons without a special permit; trains of trailers of not more than three vehicles, each of which is limited in weight with load to 12 tons, will be permitted, provided that a brakeman is serving on the rear vehicle, the speed being limited to six miles an hour.

In a number of the streets traffic is permitted to move in one way only, and at street intersections, where the traffic is controlled by policemen, the public is not permitted to cross until the signal for general movement by the pedestrians is given. Permits may be issued to occupants of buildings which allow them to mark with white the part of the curb in front of the buildings at which no vehicle shall stop, except to discharge passengers or freight, as designated by the permits.

CO-OPERATIVE DELIVERY TRIAL.

Charles Hamm, who operates several motor vehicles in public service in Waukesha, Wis., a community with a population of about 15,000 people, has converted the business men of that city to the possibilities of co-operative delivery, and he has arranged to do the work for them for 60 days, with the understanding that if results are satisfactory the service will be continued. Mr. Hamm has maintained that he can do the work at a saving of approximately 20 per cent. for each concern interested, and he believes that the experiment will develop decided economies, as well as insuring prompt and certain delivery. A central receiving and distributing station is to be established and five daily deliveries will be made, three in the morning and two during the afternoon.

F. H. Carrol, D. C. McCord, A. G. Griggs, E. P. Waldron and E. Rothschild are the incorporators of the Pontiac Drop Forge Company, with capital of \$125,000, recently organized at Pontiac, Mich.

With capital of \$200,000 the Float-Jet Carburetor Company has been organized at Newark, N. J., by E. G. Gifford, S. Smith and B. Smith.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXIII--Construction and Operation of Heinze Magnetos, Which Differ from Conventional Design in That the Magnets Are Round Instead of Rectangular--Special Triple System for Two-Cylinder, Four-Cycle Opposed Motors.

(By C. P. Shattuck.)

A SUFFICIENT number of low-tension magnetos has been discussed to enable the reader to grasp the principles involved and to note readily any variation in the application of these in other instruments. It has been pointed out that the low-tension magneto is one having an armature carrying a single winding of primary wire and that the energy required for the current to bridge the air gap of the spark plug is obtained by the utilization of a transformer coil, which construction generally embodies a primary and secondary winding and a condenser. As previously stated, the low-tension magneto is referred to in these discussions as one requiring the services of a coil to transform the primary current into a high-tension.

Heinze Magnetos.

The Heinze Electric Company, Lowell, Mass., maker of ignition apparatus, designates its magnetos as low-tension instruments. Two types are illustrated herein, the four-cylinder unit being shown at Fig. 147 and the two-cylinder at Fig. 151. Both designs are listed as types DM, but are distinguished by numbers. For example: The four-cylinder magneto is known as model 17 A and the two-cylinder as model 18 A. These differ only in the number of terminals incorporated in the distributor, there being four in the model 17 A and two in the model 18 A.

It will be noted that the shape of the permanent magnets utilized in the Heinze magneto differs from conventional practise as well as from those previously described. Instead of rectangular magnets being employed the Heinze Electric Company fits round members, stating that a perfect contact with the pole pieces is obtained by this construction. The ends of the magnets are carefully ground, and the holes in the pole pieces accurately reamed. The fit is such that opportunity for vibration loosening the magnets is held to be eliminated, and it is stated that a much more powerful magnetic field is obtained. The magnets are constructed of carefully selected, high-grade tungsten steel.

Single-Wound Armature.

The armature is made of the best magnetic iron and the material is carefully annealed. It carries a single winding of primary (coarse) wire, well insulated and impregnated with a compound that insures maximum durability, and the construction rotates on high-grade annular ball bearings which are tested to 300 pounds carrying capacity.

The breaker or interrupter box is constructed to prevent the entrance of moisture or foreign elements,

is easily removed, and is retained by what is termed a name plate rod by the maker. This rod is slipped to one side when it is necessary to displace the name plate or cover as when cleaning and adjusting the platinum contact points, for example.

Breaker Box.

The breaker box or case is constructed of steel tubing with fibre insulation which is shrunk on to the outside. This case carries the regular timing lever, which provides for the usual advance and retard of the time of breaking of the contact points, and as is customary, the lever is supplied for either right or left

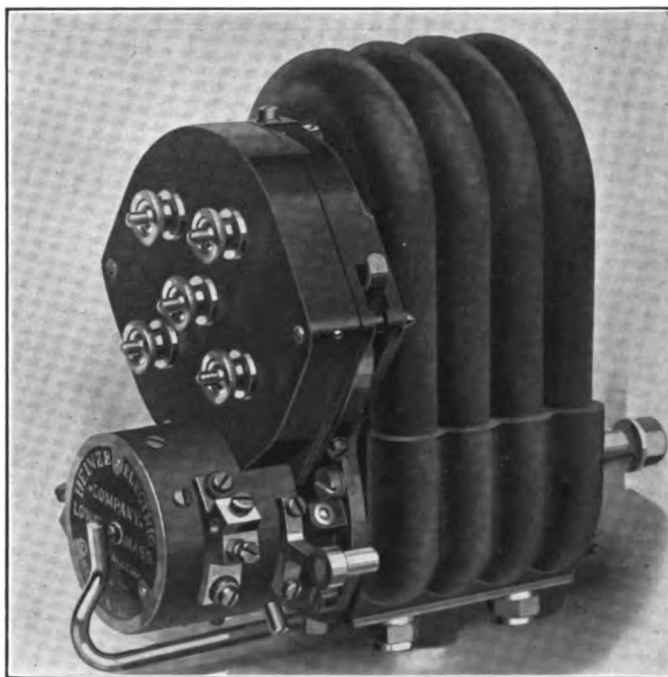


Fig. 147--Model 17 A, Type DM Heinze Magneto, a Low-Tension Instrument Having Round Magnets and Utilizing a Transformer Coil.

hand side. It is fitted at the bottom if desired.

The components of the breaker mechanism are depicted at Fig. 149, and it will be seen that, with the exception of the cam on the armature shaft, the components are stationary; that is, they do not revolve with the armature.

The interruption or break of the primary current is obtained by a make and break lever L which carries a roller. The lever is pivotally mounted and carries a platinum point P, which is normally held in contact with a platinum pointed screw P 1 in the case by means of a contact spring. The four-cylinder magneto is provided with a double-pointed cam, while

the two-cylinder design has a single point.

With the instrument shown at Fig. 149 the current generated by the magneto is interrupted twice every revolution of the armature shaft, as the contact of the cam with the roller causes the contact point P to break with the point P 1.

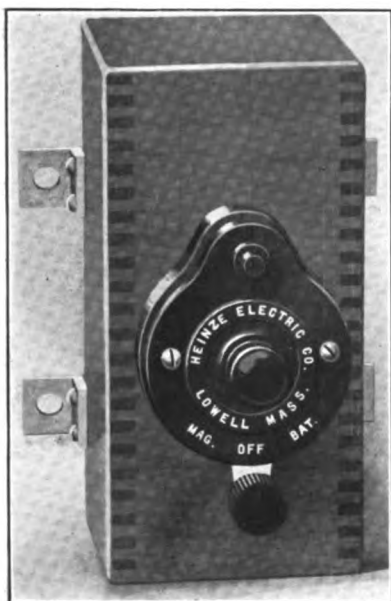


Fig. 148—The Transformer Coil Box with Kick Type of Switch.

The adjustment of the platinum screw member P 1 in the Heinze magneto is made easily. It will be noted that the screw member P 1 extends through the case or housing, and that it is retained in position by a lock nut. By loosening this nut and adjusting the screw, the results obtained by changing the gap may be determined with the motor operating. The maker, however, does not recommend the practise, as the points should always be set with the wrench gauge accompanying each instrument. The proper distance when the points are fully separated is .02 inch. The points are cleaned in the usual manner, with a very fine file.

The terminals employed on the breaker box or cover lifter differ from those generally used. Instead of a knurled locking nut the Heinze utilizes an extruded side piece assembly, one on either side. The leads from the battery and coil are placed in the openings T and securely locked by a screw. This provides a very compact construction, one that is easily removed and replaced at a slight cost without dismantling the breaker box. The terminal at the left is connected with the brush arm A, which makes contact with four bronze studs S, as will be noted at Fig. 149. The contact of the brush with the studs is light, but positive.

Distributor Mechanism.

Fig. 149 also shows the construction of the distributor, the view being a partial phantom one. The design follows conventional practise, the distributor brush being secured to the distributor gear, which is driven off the armature shaft, and makes one revolution to two of the last-named member.

The distributor case is constructed of the best grade hard vulcanized rubber condensite, a material insuring maximum durability even when subjected to a high degree of heat. It is easily removed by compressing two spring members, and its fit prevents the entrance of moisture or road dust.

Transformers.

The coils utilized are constructed on the same general principle as those manufactured by the Heinze

Electric Company for a number of years. Not only are the designs compact, but the case in which the coil proper is contained is nicely finished. The type 13 C transformer coil, shown at Fig. 148, is of the non-vibrating type; that is, there is no vibrating spring. The coil proper comprises a primary and secondary winding, also a condenser, and the principle is similar to the induction coils previously described with the exception of the vibrator mechanism. With the Heinze system the break or interruption of the primary current is obtained by the contact points in the breaker mechanism.

Special merit is claimed by the maker for the secondary winding. It is of a patented design which, it is stated, permits of using a larger number of turns than is generally obtained in a coil of similar size. The company states that its method of winding not only insures maximum efficiency, but permits of the highest voltage or greatest potential to exist at a distance, which eliminates all dangers of a burn-out or break down in the secondary. The wire utilized in the secondary winding is of the enamel silk insulated copper variety. The primary is principally constructed of the best grade of Norway iron wire and is wound with a silk insulated wire of proper diameter. The condenser is constructed of a high-grade tin foil and paper, manufactured especially for this purpose. After the interior windings are installed in the coil box they are insulated with a sealing wax compound which penetrates every crevice, preventing the entrance of

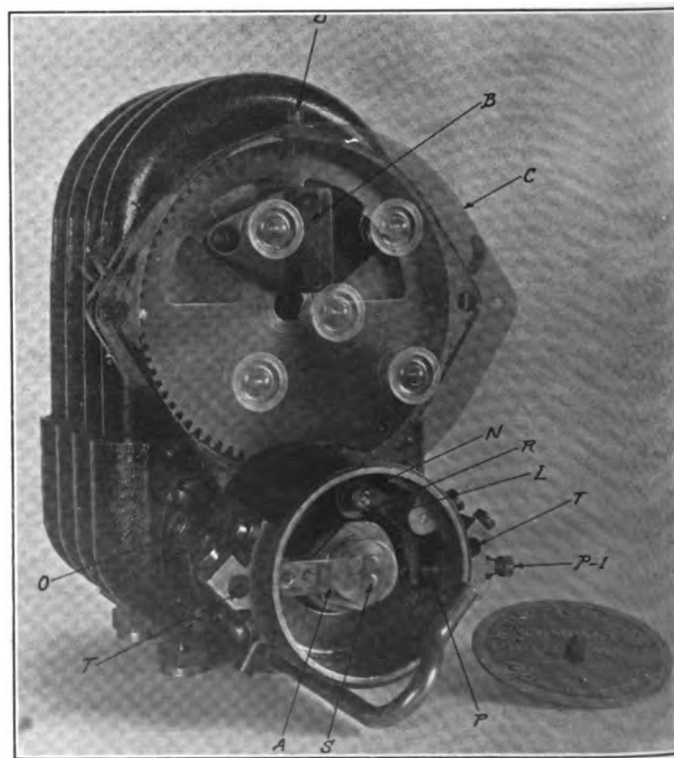


Fig. 149—Showing the Construction of the Breaker Box of the Heinze Magneto—It Differs from Conventional Design, as Will Be Noted by the Position of the Adjustable Contact Screw.

moisture. The Heinze coils are equipped with sturdy, compact switches of conventional kick type.

The wiring plans of the four and two-cylinder mag-

netos are shown at Fig. 150. That at A depicts the four-cylinder dual system and it will be noted that the auxiliary source of supply is a set of six dry cells. As

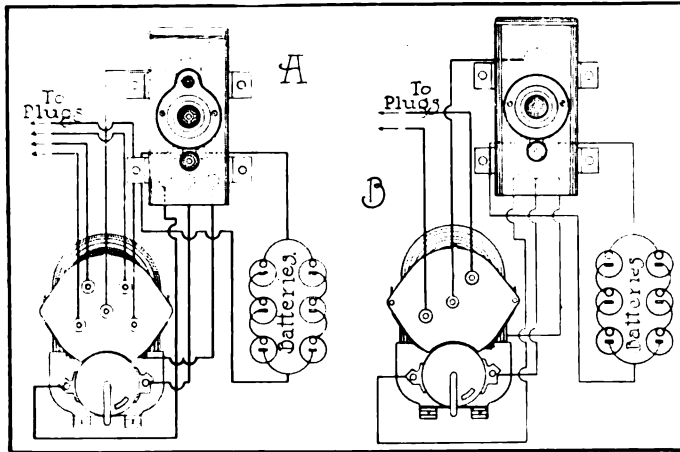


Fig. 150—Wiring Plans of Heinze Magnetos: A, Diagram of Four-Cylinder Magneto; B, Two-Cylinder Unit—Note That in Both the Battery Current Is Not Grounded.

with all low-tension magnetos employing a transformer coil, the current generated by the instrument is led to the coil, where it is transformed into a high-tension, thence to the distributor of the magneto. The centre is utilized, and the distribution of the high-tension current to the spark plug cable terminals is accomplished in the usual manner.

The wiring plan of the two-cylinder magneto is shown at Fig. 150 A, and the plan is similar to that of the other instrument with the exception that there are but two leads from the distributor. It will be noted that in both systems the current from the batteries is not grounded, both leads being connected to the proper terminals on the coil.

Dual Ignition.

The Heinze systems provide dual ignition on the same set of spark plugs. The dry cells are utilized for starting purposes and may be employed for operation if so desired. The change of the current supply is made in the conventional manner by moving the switch lever from the "Battery" side to the "Magneto" position. With the switch lever in either position, the primary current is interrupted by the breaker mechanism of the magneto and the high-tension electricity obtained by the transformer coil. Where an independent dual ignition system is required the company supplies a four-cylinder coil having a switch so that either the batteries or magneto will operate independently, or both together.

Special Triple System.

Among other ignition apparatus produced by the Heinze Electric Company is the low-tension magneto model 16 type AM, with which is supplied a transformer coil of the type 12-C. This is a special triple system for two-cylinder, four-cycle, opposed motors.

With this system the current when running on the magneto is generated in the armature and travels through the primary winding of the coil and back to the armature by the way of the ground, it being strict-

ly a low-tension current and entirely independent, except by induction of the secondary circuit. The high-tension current is obtained by the secondary winding by induction from the primary of the coil and travels through the high-tension cable to the spark plug on one cylinder, through the spark gap to the ground, then through the spark gap of the second cylinder to the insulated electrode of the spark plug, returning by the way of the high-tension cable to the other end of the secondary winding.

With this system of wiring the spark occurs in both cylinders at the same time, but only one fires, for when the piston of one cylinder of a two-cylinder, four-cycle opposed type of motor is in the proper position for the burning of the charge, the other piston is completing the exhaust stroke. As the magneto produces the proper amount of energy, it is held that the simultaneous occurrence of sparks is practical.

(To Be Continued.)

BINGHAM DELIVERY WAGONS.

The Bingham Manufacturing Company, Cleveland, O., has leased the plant of the Electric Locomotive and Engineering Company of that city, which comprises several buildings and a site of two and a half acres, for seven years, with the option of purchasing. The company will soon begin the production of a light, cheap delivery wagon that will have a 25-horsepower motor and a wheelbase of 114 inches.

The company was originally organized to produce carburetors and spark plugs, but has not been especial-

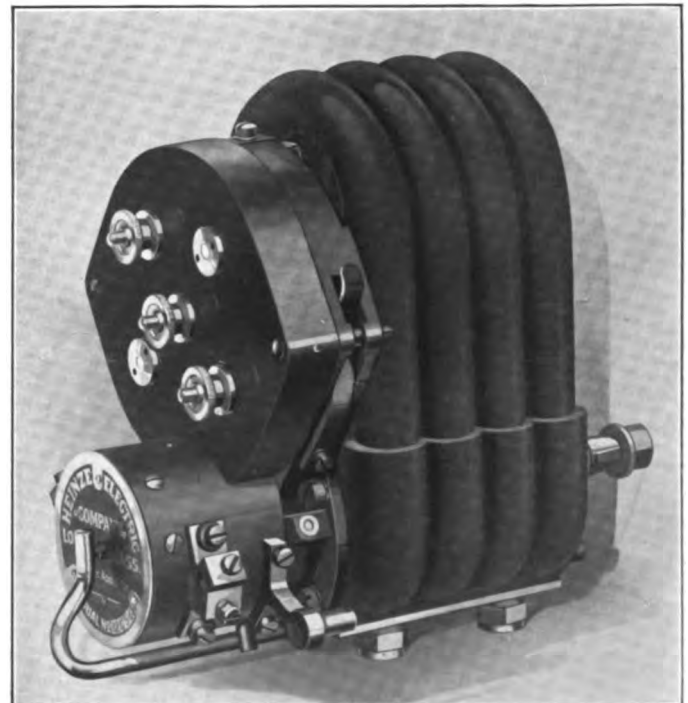


Fig. 151—The Model 18 A, Type DM Heinze Magneto is Designed for Two-Cylinder Motors and the System Provides Dual Ignition.

ly active. Its endeavors have now been directed toward vehicle building, and the intention is to produce approximately one machine a day.

HINTS FOR PROPER MAINTENANCE.

DRIVERS who undertake the work of maintaining the commercial vehicle in an efficient condition, should not overlook the spark plugs in the overhaul

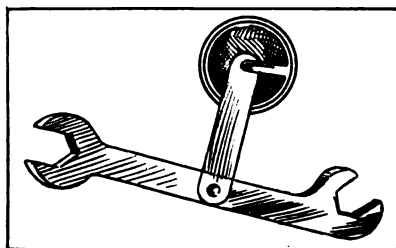


Fig. 1—Using Splitdorf Magneto Gauge to Set Spark Plug Gap.

or when grinding in the valves. The practise of guessing at the gap when changing the position of the electrodes or points is not to be commended. It is obvious that when the manufacturer of the magneto used on the motor states that the gap should be 1-64 inch to obtain the best of results, a fine measuring tool is necessary to insure a correct space.

It is equally important that the gaps of all plugs should be the same. This applies particularly where the source of current supply is a magneto, for it is well known that generally when its armature is rotating at very slow speeds the spark is not as intense as it is when the instrument is being driven at high speeds.

The use of coins, such as a nickel or a dime, for adjusting the points, is suggested in some instruction books, but the writer does not agree with the authors, because of the fact that the thickness of the metal will vary with wear, etc.

The best method is to utilize the magneto wrench gauge, which is supplied with every instrument, and which can be purchased at any supply house for a few cents. If more than one machine is cared for and different magnetos are fitted, two gauges will generally suffice. One should have a blade 1-32 inch thick and the other a 1-64 inch blade.

Of course there are certain types of spark plugs with which the magneto gauge cannot be successfully employed, but with designs similar to that shown at Fig. 1, which depicts the use of a Splitdorf gauge, the magneto wrench blade can be utilized.

In setting the points it is well to examine the negative member or electrode integral with the shell, for it may be so burned that a recess is formed. When such is the case the points should be filed until the surface is true, otherwise the gap will be 1-32 inch plus the depth of the recess.

STARTING CRANKS.

The bushing or bearing of the starting crank is, perhaps, the most neglected component of the motor car. It rarely gives trouble, but after long service play results from wear, and if the design be of the jaw clutch type, the jaw members will not mesh properly. As a result it is difficult to crank the motor.

A method of eliminating the trouble is shown at Fig. 2. It consists of displacing both jaw members, and drilling and fitting a substantial pin to the extension of the crankshaft. It is advisable to secure the pin by a smaller member, as shown at A. The clutch member is depicted at B. This is made from steel and slotted as shown, two being provided, diametrically opposite. The starting handle is fitted to the clutch and pinned, but in attaching it should be so adjusted that the motor will be turned over past the ignition point before the handle attains a vertical position. This is important.

The clutch in position is shown at C. It will be seen that the slotted member grips the pin, but upon the motor starting the pin will push the clutch out of engagement. The cost of making the clutch, etc., is not excessive, and it is decidedly more satisfactory than the one previously referred to.

STERNBERG CHANGES NAME.

The name of the Sternberg Manufacturing Company, Milwaukee, Wis., was on July 1 changed to the Sternberg Motor Truck Company, this being for the purpose of identifying the nature of the business the concern is engaged in. The company was established in Davenport, Ia., 40 years ago, by William Sternberg, Sr., and was removed to Milwaukee in 1905. The company was originally created to build traction engines and production of motor trucks was a natural sequence. Sternberg trucks are built of two, three, four, five, six and seven tons capacity, and for the 1915 market worm and wheel driven trucks will be built of 1000, 4000, 6000 and 10,000 pounds. The 6000-pound demonstrating trucks will be ready for delivery late next month, in September the 4000-pound machines will be turned out, and the two other sizes will be produced as quickly as possible thereafter. The company tested its worm-driven trucks for more than two years before beginning production commercially. The

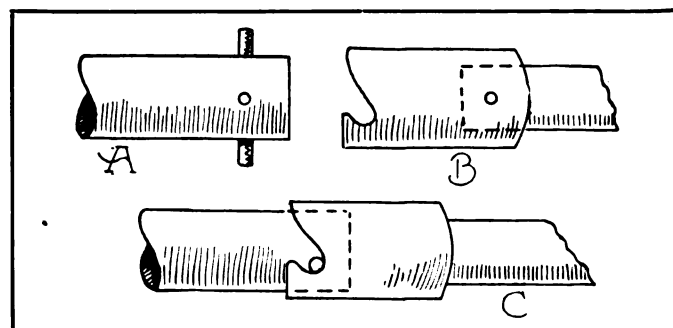


Fig. 2—Simple Form of Starting Ratchet: A, Pin in Crankshaft; B, Ratchet Fitted to Starting Crank; C, the Components in Place.

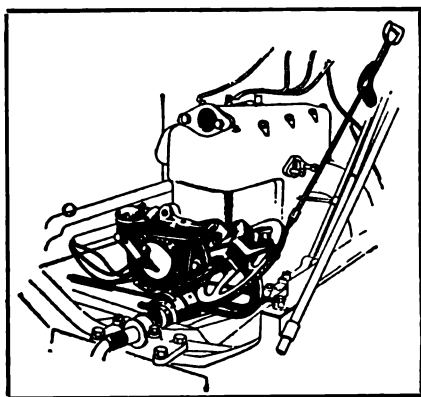
company has developed a simple spur and worm gear automatic body hoist that will be fitted to all dumping bodies on chassis from four to seven tons capacity.

CORRESPONDENCE WITH THE READER.

Motor Starters—W. J. D., Providence, R. I.

Will you kindly advise me as to the different types of motor starters adaptable to the Ford car? I use a Ford delivery car in my business and make a large number of stops. This means that I have to churn the handle. The price of the starter is some object, as I do not wish to expend money on an expensive system.

Generally speaking, there are three types of motor starters manufactured for the machine mentioned.



Boston Starter.

These include the electrical, mechanical and compressed air designs. The majority of the electrical starters are combined with the generator; that is, the system provides both lighting and starting. The compressed air type utilizes air stored

in a tank, and the crankshaft of the engine is rotated by applying the energy of the air to the piston, much in the same manner as the expansion of the gases used. The Kellogg Manufacturing Company, Rochester, N. Y., makes a system of this type for the Ford car. The mechanical type of starter is favored by many owners of the Ford car, and its design is generally such that a slight pull upon a handle or pressure upon a pedal imparts a rapid movement to the crankshaft of the engine. The force or energy is obtained by providing considerable leverage, and it is stated by the makers of the first-named type of starters that a slight effort upon the part of the operator will spin the motor. They make for convenience in that they are operated from the seat. Another quality of the designs is that their installation does not interfere with the use of the conventional starting handle, which is not displaced.

Two types of mechanical starters are shown herewith. That at Fig. 1 is the Boston, manufactured by the Automatic Appliance Company, 172 Columbus avenue, Boston, while that depicted at Fig. 2 is produced by the Universal Manufacturing Company, Racine, Wis.

The first-named type is operated by a handle which rotates a large pulley, attached to which is a drum member carrying a chain. This chain is secured to the starting mechanism on the crankshaft of the motor, and upon the handle being pulled a rapid rotation is imparted to the crankshaft because of the leverage obtained.

A handle in the toeboard of the car is employed with the Universal, which is shown installed at Fig. 2, and with the starting mechanism in its normal position. Upon the handle being pulled by the operator,

the chain pulls the starting mechanism to the right, imparting a rapid movement to the crankshaft.

With both types provision is made for taking care of a backfire and both designs can be installed without making any alterations to the power plant. Being located under the hood the appearance of the machine is not impaired.

Fuel Savers—Driver, Buffalo, N. Y.

I note you publish accounts of fuel savers. Do these really save fuel and improve the operation of the motor? How is it accomplished, and would you advise fitting one to an old motor having an old type of carburetor?

The claim made for the fuel economizers that they save fuel is based upon the fact that the more complete the vaporization and mixing of the fuel with the air, the more efficient is the mixture. A proper mixture is one which ignites readily, is not slow burning, and does not contain too much air in proportion to the fuel or vice versa.

With some types of old carburetors, especially those which have seen considerable service, it is difficult to obtain an efficient mixture at all motor speeds; that is, the engine may run smoothly at speeds up to 15 or 20 miles an hour, but at higher the mixture will be too rich or too lean. Another factor is that of additional air due to leakage around the valve stems, etc. The effect of this is more pronounced at low motor speeds than at high.

The principle involved in the fuel savers referred to is that of admitting extra air into the intake manifold between the carburetor and the cylinders, so controlling the air supply that it is proportioned to the requirements of the motor. The majority of designs are manually controlled from the seat, although some provide for automatic regulation of the air admitted.

Efficiency is obtained by the impact of the air breaking up and converting into vapor any particles of what may be termed raw fuel not vaporized by the carburetor. This generally makes possible cutting down the fuel supply, obtaining economy.

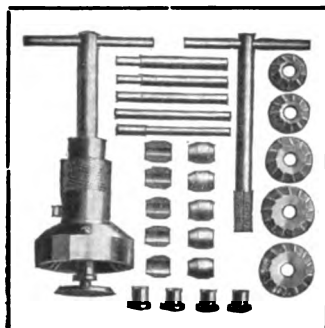
As to their practicability, the writer knows of a number of instances where the devices have been fitted to motors with successful results. If the motor be an old one the device will be found particularly beneficial at high motor speeds. Generally fuel savers are easily installed by drilling a hole in the intake manifold.



Universal Ford Starter.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

AFTER considerable service the valves of the internal combustion motor will need seating, the work requiring accurate tools. H. G. Paro, suite 719,



Fossnacht Valve Reseater.

Michigan boulevard building, 30 North Michigan boulevard, Chicago, is marketing the Fossnacht valve reseating equipment, shown in an accompanying illustration. This tool has demonstrated its practicality in service, having been utilized in a large number of garages and service stations.

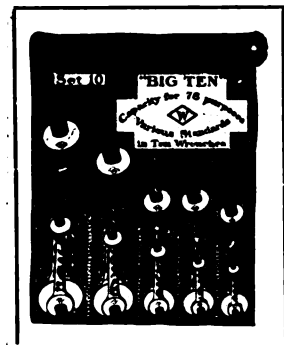
The maker calls special attention to the time and labor saving qualities of the tools, also to the fact that the equipment is such as to make possible the reseating of valves in a large number of motors, the size of the cutters being such as to accomplish general work. The maker claims great accuracy for the reseater and points out that valves may be placed in a perfect condition in considerably less time than with the usual methods. The tool is moderately priced and complete details and prices will be supplied the trade upon the receipt of a postal card at the address previously given.

CINCINNATI BALL JOINTS.

The Cincinnati Ball Crank Company, Oakley, Cincinnati, O., is marketing a ball joint for spark and throttle controls. One of the qualities of the design is the use of an internal spring construction which takes up wear, eliminates noise and prevents backlash or lost motion. It comes completely assembled.

WILLIAMS WRENCH SET.

J. H. Williams & Co., Brooklyn, N. Y., is manufacturing the Williams "Big Ten" set, shown in the accompanying illustration. It has a capacity for 78 sizes of most prominent nut, screw and set screw sizes in United States and other standard millings, and was designed to provide the maximum of service in the machine shop, etc. It is particularly adaptable to the garage and repair shop, as the wrenches fit A. L. A. M.



"Big Ten" Wrench Set.

and S. A. E. standard nuts and cap screws. The milled openings vary from 5-16 inch to 1 7-16 inches. The wrenches are constructed of the best material, and the roll shown comes at

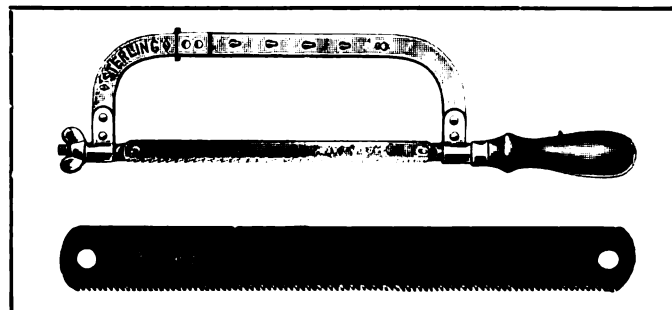
slightly extra cost. J. H. Williams & Co. specializes in drop forged tools and will supply the trade with descriptive matter and prices upon request.

STERLING HACKSAW BLADES.

One of the most important and useful of small tools in the garage, repair shop and service station is the hacksaw blade. It is employed to cut metals of all kinds, tubing, pipe, steel, iron, brass, etc., and to obtain satisfactory results it is necessary that a blade be used that will give the best general service on all such metals.

It is the opinion of practical hacksaw makers that a medium pitch blade about 24 teeth to the inch, in a 12-inch blade about 5/8-inch wide, and in an eight-inch blade, 1/2-inch wide, should give the best general results without the operator continually being obliged to shift the blade in the frame for different classes of work.

The Diamond Saw & Stamping Works, 361



Sterling Adjustable Hacksaw Frame and Blade.

Seventh street, Buffalo, N. Y., specializes in hacksaw blades and frames, and the Sterling trade mark is well and favorably known to the trade. An accompanying illustration shows its adjustable frame, which takes eight, nine, 10, 11 and 12-inch blades. The frames are light, strong in the centre, and can be quickly and easily adjusted to take the blades named. The blade is adjustable to four different angles. The frames come nickelled or polished.

The company also manufactures solid frames for eight, nine, 10, 12 and 14-inch blades. These are constructed of high-grade material and are nicely finished. In addition to producing blades for hand frames and of different thickness, length, width, teeth, etc., the company makes a large variety of blades for power machines. Descriptive matter and prices will be mailed free upon request.

JACOBS DRILL CHUCK.

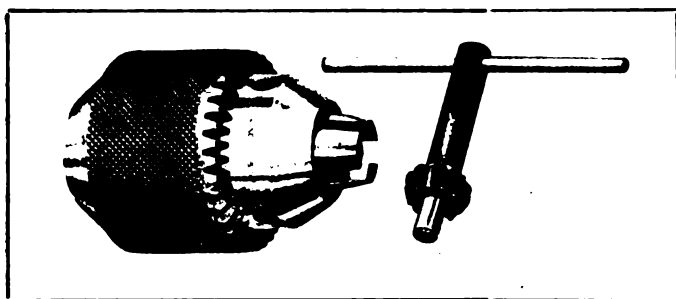
The Jacobs Manufacturing Company, Hartford, Conn., is marketing the Jacobs improved drill chuck, shown in the accompanying illustration, and the maker states that it possesses many advantages over ordin-

any types. In general form it is similar to the well known spanner sleeve chucks, but has a toothed sleeve and key which the manufacturer states makes for decided efficiency, as by the action of the key the initial or final adjustment of the drill is made easily and quickly by one hand.

The No. 3 chuck is shown, and it has a capacity up to 17-32 inch. The total length of the jaws extended is 3 5-16 inches, with jaws retracted, three inches. The outside diameter is 2 5-16 inches, and its weight without the key is slightly over two pounds.

This type was designed to meet the demand for a convenient, accurate, durable drill chuck of the capacity above named, and is not only especially adapted and convenient for service in a lathe, but a hole may be bored through the chuck and spindle the size of its full capacity. It is also convenient for holding rod stock, etc.

One of the qualities of the Jacobs design is that it may be easily disassembled and assembled. It is taken apart by forcing the sleeve over the smaller or jaw end of the chuck, when the nut, which is made



No. 3 Jacobs Improved Drill Chuck.

in halves, may be taken out, leaving the jaws free for removal. When the jaws are retracted, they extend into a recess in the sleeve, which makes it necessary that they be partially extended before attempting to displace the sleeve. The company manufactures a wide variety of these chucks and will supply complete details and prices upon request.

K & B ADJUSTABLE WRENCH.

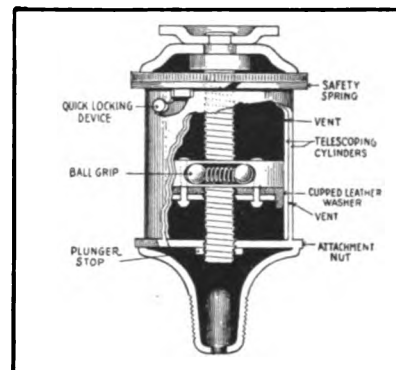
The Kilborn & Bishop Company, New Haven, Conn., is manufacturing the K & B adjustable wrench, which opens on an angle of 22.5 degrees with the handle, permitting of its use in places difficult of access with ordinary tools. All parts are interchangeable and carefully fitted. The movable jaw and handle each are a solid piece, set in drop forging. The shape of the handle is such that the hand readily becomes conformed to it.

CLIMAX GREASE CUP.

William J. Bailey, 407 Mulberry street, Newark, N. J., is marketing the Climax grease cup, a cut-away section being shown herewith to depict the construction. It is of the compression type, and it is stated that the top cannot drop off, even if the cup should be

inverted. A slight pressure downward and to the left releases the inner cylinder, enabling easy filling, or the outer cylinder may be supplied if desired.

The cylinders are drawn brass tubing and a close telescoping fit, preventing leakage and the entrance of road dust. The cylinder caps are of heavy brass, hard soldered to the cylinder, and the air vents in both cylinders are so located that renewing supply of lubricant is very easy. When withdrawing the inner cylinder these air vents prevent suction, as well as grease coming away with the part. A double ball grip is employed to prevent the plunger turning and wear. The Climax grease cup is produced in standard and special sizes. Prices will be supplied upon request.



The Climax Grease Cup.

MUELLER CLAMP LIGHT.

To supply a long felt want, R. S. Mueller, 425 High street, Cleveland, O., is manufacturing a clamp light for garage and repair shop purposes. This lamp, as shown in the accompanying illustration, consists of a socket with a combined reflector and wire guard, which concentrates the light on the section needed and protects the bulb from breakage.



Mueller Clamp Light, Having Adjustable Jaws, Polished Reflector and Ample Length of Cord.

A practical feature of the Mueller clamp light is the clamp, which will stick to anything from 1/4 to 2 1/8 inches, and may instantly be attached to bench, pipe,

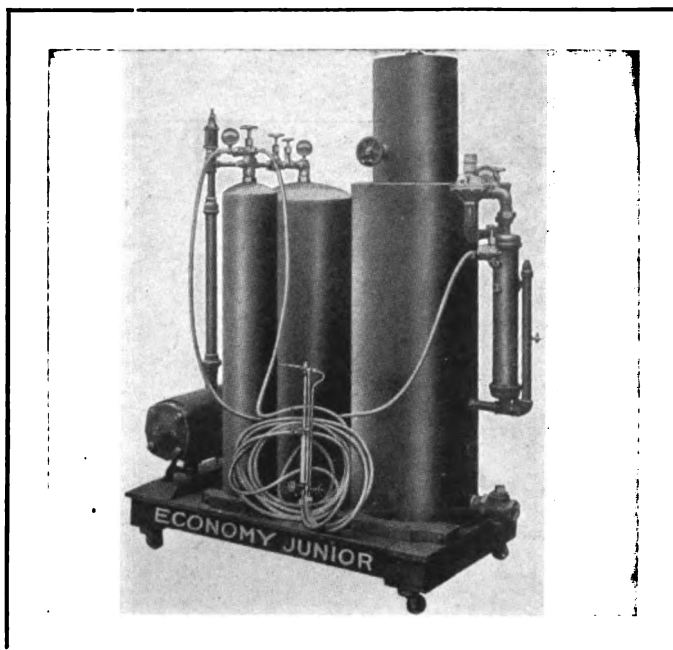
rod, spoke fender, etc., making for convenience, as well as permits the use of both hands.

The complete outfit consists of the clamp, socket, reflector wire guard, 20 feet of flexible, high-grade cord and plug. Price and descriptive matter will be furnished upon request.

ECONOMY WELDING OUTFIT.

The Economy Welding Machine Company, Kansas City, Mo., specializing in welding equipments, is marketing what is known as the Economy Junior outfit. It was designed to meet the demand for the moderately priced high-grade equipment, and one of its qualities is the provision made for generating the acetylene gas, a feature that will appeal to those not conveniently located to a source of supply.

As will be noted by the accompanying illustration the outfit is mounted upon a substantial wooden platform, which is 30 by 53 inches and fitted with roller



Economy Junior Welding Equipment.

bearing caster wheels. This permits of moving the apparatus in proximity to the work.

The oxygen generator is a steel storage tank, 16 by 48 inches, and the steel wash bottle is eight by 48 inches. All are constructed for 200 pounds working pressure and are tested to 300. The generator is provided with an Economy oxygen relief valve, regulating valve, high and low pressure gauges, stop pressure valves, hose connections, drain cocks, etc. The steel retort is five by 21 inches, fitted with gas or gasoline burners.

The acetylene pressure generator is 18 by 48 inches, oxy-acetylene welded, and tested to 20 pounds working pressure. The carbide hopper has a capacity of 25 pounds, and the carbide is fed by a hand feed of special design.

The balance of the equipment includes the Economy diaphragm relief valve, with gas tight bonnet con-

necting with relief pipe; regulating valve, flash back preventer, drying and filtering chamber, pressure gauge, hose connections, two-inch drain valve, etc. The torch is the No. 1 style, and has seven welding tips, numbers 1 to 7, and a removable cutting attachment with three tips. The company is issuing a pamphlet on welding which will be mailed free upon addressing the home office.

GIDDINGS UNDER-CUT DRILL.

The Giddings under-cut drill is marketed by the Giddings Under-Cut Drill Company, 184 Summer street, Boston, and among the features of the tool is that when utilized in conjunction with a special chuck made by the company, it will bore an under-cut hole which locks the babbitt metal securely and permanently to any surface.

The drills are made in standard sizes, .5, .625 and .75 inch. Special sizes are made to meet requirements. It is stated that the drills will bore a hole in five to 10 seconds, and that the best of material and workmanship are incorporated. Descriptive matter and price list will be mailed free on request.

TRAFFIC IN PHILADELPHIA.

The control of street traffic was the subject discussed at the June meeting of the Motor Truck Association of Philadelphia, at which time addresses were made by City Statistician E. J. Cattell, Police Lieutenant W. D. Mills, in charge of the traffic regulation of the city, and E. S. Foljambe of the Commercial Car Journal. Mr. Cattell directed the attention of the meeting to the possibilities for street economy by the use of motor trucks and power wagons by the enormous manufacturing interests of the city and vicinity, and showed how reduction of traffic would be in many ways beneficial, but chiefly in the lessening of the cost of vehicular transportation. Lieutenant Mills outlined some of the problems that must be dealt with by the police, and the improvements made and contemplated. There was a very good representation of all branches of the industry and the meeting was exceedingly beneficial.

OIL SEPARATOR ORDINANCE KILLED.

The New York City board of aldermen has repealed the ordinance requiring the installation of separators, to remove oil and gasoline from water drained into sewers, there being but one vote out of 58 in favor of continuing it. The main objection by the garage owners was to the large expense of installations that were shown by careful and scientific tests to be absolutely useless for the purpose designed. Four organizations of garage owners took up the fight to obtain the repeal of the ordinance, after a series of prosecutions for failure to comply with it, and convinced the aldermen of the justice of the contention.

EISEMANN MAGNETO ATTACHMENT FOR FORD.

IN KEEPING with its policy not to market a new product until it has been thoroughly tested in practise, the Eisemann Magneto Company, Brooklyn,

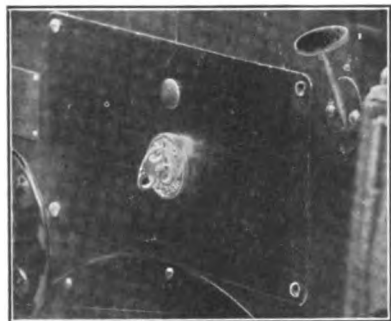


Fig. 1—Switch Used with Eisemann Ignition System for Ford.

N. Y., has withheld details of its magneto attachment for the model T Ford motor until recently. In designing the equipment the company gave careful consideration to the method of drive and lubrication, important factors with this high-speed motor. Quietness of operation and accessibility, as well as ease of installation, are features.

The simplicity of the equipment will be noted by reference to Fig. 2, and each detail has been worked out very carefully. For example, the trouble generally experienced in removing a gear from a conical shaft without the aid of a special tool is eliminated in the Eisemann design by a simple device in which the removal of the nut retaining the gear in place automatically pulls off the gear. Another feature, one that will appeal particularly to those not familiar with timing a magneto, is the use of marked gears and an indicating window on the instrument. There is no reason why the most inexperienced should not be able to correctly install the equipment, as the instructions are easily followed.

The attachment is an aluminum casting, it serving a double purpose, in that it provides a bracket for mounting the magneto, also a housing for the driving gears. The structure provides a rigid, well ribbed mounting, and as all bolt and screw holes are accurately machined, it is simply a case of utilizing the parts supplied.

The gear housing, which is integral with the bracket, has two removable covers, these permitting of the fitting of the large camshaft gear and armature gear. The entire construction is proof against leakage of lubricant, special gaskets being utilized.

For driving the magneto, two bronze gears are employed. The larger one is securely fastened to the camshaft by means of a spacing ring, dowel pin, lock washer and a nut. The dowel pin is extra heavy and, passing through the gear directly into the shaft, assures a positive and reliable drive. The magneto pinion is retained by a Woodruff key, lock washer and nut, and the magneto is secured to the bracket by dowel pins and straps. Control of the movement of the breaker box of the magneto, providing variable ignition, is by means of a shaft passing through a solid bearing in the support, and a lever and link. This

linkage is connected to the Ford ball joint at the base of the steering column by a second lever and rod. The movement provided is sufficient to permit the timing lever of the magneto to be advanced to its maximum without the spark lever travelling over the entire length of the quadrant.

Careful attention has been paid to supporting the high-tension wires leading from the distributor of the magneto to the spark plugs, a solid bracket being utilized. It is secured to the two middle bolts of the stirrup holding the intake and exhaust manifolds.

As the Eisemann system eliminates the coil, the space on the dash is neatly covered by an enamelled steel plate, as indicated at Fig. 1. This plate carries the Eisemann switch, a simple and efficient construction, one permitting of securely locking the car, as its key is removable. Moving the key to the side of the switch marked "M" permits the high-tension current of the magneto to pass to the plugs. To cut off the current supply, the key is pushed in and moved to the "Off" position. As with all true high-tension magnetos, the motor is stopped by grounding the primary current, and with the Eisemann Ford installation a wire is carried from the breaker box to the switch, thence to a cylinder head bolt, the arrangement being clearly depicted at Fig. 2. The simplicity of the wiring plan is obvious.

The magneto supplied is the well known EM type, a true high-tension magneto, which provides a very hot spark at very low motor speeds, and it is stated that the Ford motor car can be started easily on a quarter turn. For those desiring to start the motor on the spark, the Eisemann Magneto Company supplies the dual ignition system, type EB. This includes a flush type dash coil, having a starting button, which, when pressed, produces a shower of sparks in the cylinder on compression. This system lists for \$5 extra.

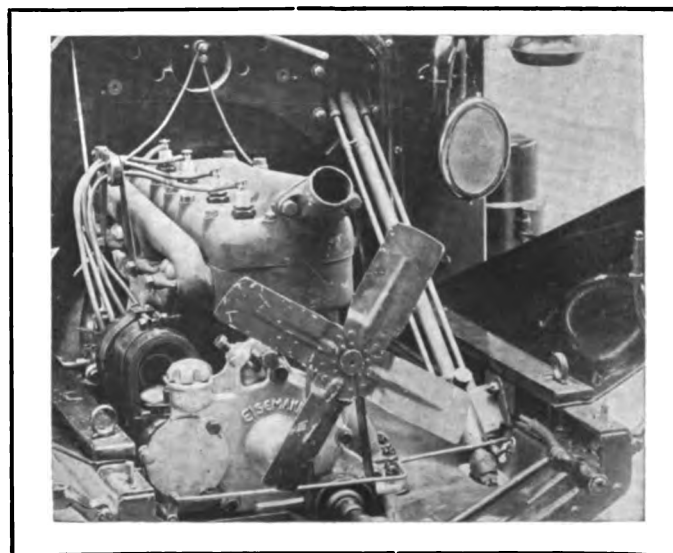


Fig. 2—Showing the Eisemann Magneto Attachment for Ford Motors Installed—A Quiet Drive, Well Lubricated, Is Among Its Practical Features.

NOVEL THERMO-ELECTRIC INDICATOR.

A DEVICE for notifying the operator of a gasoline vehicle when the supply of cooling fluid requires replenishing and indicating an abnormal rise

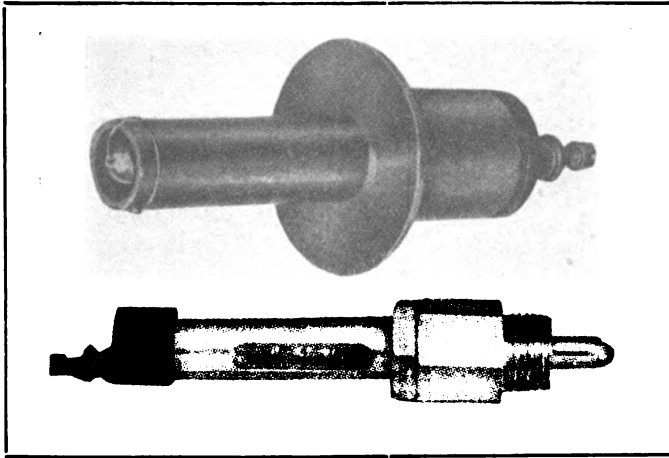


Fig. 1—Thermo-Electric Indicator for Notifying Driver of Abnormal Rise of Temperature of Water (Upper View) and When Radiator Needs Replenishing (Lower View).

in its temperature has been brought out by an English engineer. It is designed particularly for service on commercial cars employed in tropical countries. It differs from those marketed in this country in that electricity is utilized to light a dash lamp, the circuit being closed by the expansion of mercury. The device is manufactured in two styles, which, although very similar in construction, perform two different functions. One indicates to the driver when the temperature of the cooling water has risen to an abnormal degree, while the other informs him when the radiator requires water.

A sectional drawing of the thermo-electric indicator, as it is called, is shown at Fig. 2, and in this instance it is indicated applied to a radiator. The fitting consists of a brass body A having a screw flange by which it is attached to the radiator tank, and a brass tube B, which projects into the water space. This tube supports a thermometer C, into the bulb of which is fused a platinum wire, making contact with the brass tube C. A platinum wire is also fused into the other end of the thermometer tube, and is connected to a terminal D carried in a vulcanite packing E. A rubber washer G, compressed by means of a washer and nut H, prevents leakage. The electrical circuit includes a battery K, switch L and small red lamp M, the last named fitted to the dash.

When the radiator is full or the level of the water is above the instrument, the temperature is not sufficient to cause the mercury in the bulb of the thermometer to expand enough to make contact with the platinum at the other end of the tube, but as soon as the fluid falls below the tube B, the temperature of the steam generated causes the mercury to expand sufficiently to complete the circuit, and the dash bulb is lighted.

The other instrument is similar, except that in-

stead of being provided with a flange it is intended to be screwed into any convenient point in the cylinder cooling system. When thus used a lower temperature completes the circuit than in the radiator device. In installing it the normal temperature of the water is first ascertained, and a thermometer utilized which will complete the circuit when a rise of 10 per cent. is experienced. If both instruments are used, different colored lamps are employed, or one can be substituted by a buzzer, which would be more effective in attracting the attention of the driver.

WHAT IS INTERSTATE COMMERCE?

The city court at Wilmington, Del., has now before it a case that will, in the event of decision adverse to the defendant, be carried to a higher court, as the principle involved deals practically with a definition of what constitutes interstate commerce and to what extent this can be regulated by a state or municipal regulation.

The P. E. Sharpless Company, which has dairies in Pennsylvania, hauls its products by motor trucks to Wilmington, Del., and ships them by steamer to Philadelphia. No goods are sold in Delaware. The state requires a motor vehicle registration tax, but there is a clause in the law relative to registration that provides for exemption of vehicles registered in other states which grant similar exemption to Delaware motor vehicle owners. Because of this clause the Sharpless company maintains that, as Pennsylvania exempts Delaware owners from a registration tax, its vehicles need not be registered in Delaware. And the contention is further made that the company is en-

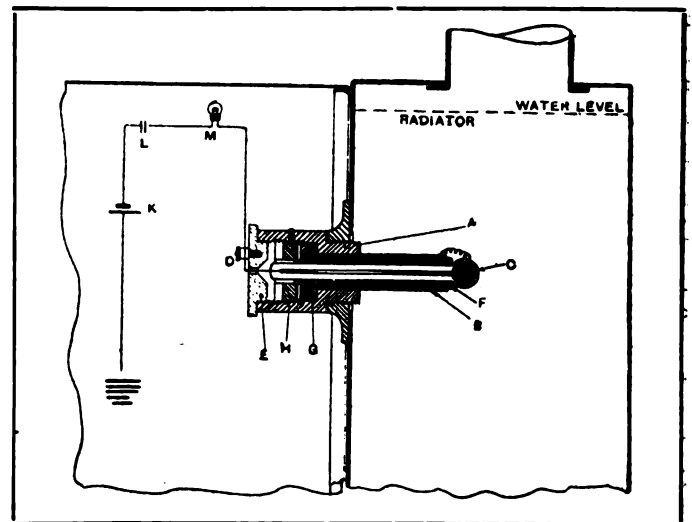


Fig. 2—Sectional View of Thermo-Electric Indicator Installed on Radiator.

gaged in interstate commerce, and for that reason it should not be required to take out a second series of registration licenses.

ELECTRIC TOOLS AND EQUIPMENT.

THE convenience of electrically operated machines appeals to the mechanic, and their use in many instances is a benefit to the customer, as considerable time is saved over manually operated tools. Where the drill, grinder, etc., are to be used occasionally, it is obvious that electric power results in economy of operation.

CINCINNATI BENCH DRILL.

The Cincinnati Electric Tool Company, Cincinnati, O., is manufacturing a line of electric drills, and in an



Cincinnati Bench Drill.

accompanying illustration is shown the No. 0 combination sensitive bench drilling stand with a portable type of hand drill. The latter can be utilized independently of the stand, or as a sensitive bench drill, providing two tools in one. The hand drill is locked or released in a bracket, by means of thumb nuts. This tool is designed particularly for shops where both bench and outside drilling is to be done.

The stand is made to hold portable hand drills of $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ -inch capacities, and the drill bracket with drill can be set at any point on the column, and raised or lowered as desired. The weight of the drill and the bracket is counterbalanced by means of a spring on the column, and the drill is maintained in vertical alignment by means of a key on the bracket and keyway in the column. The depth of the hole to be drilled is regulated by a stop at the rear of the column.

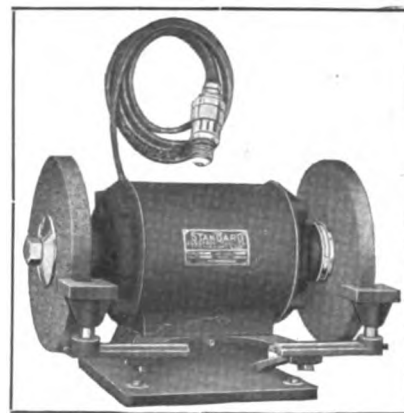
The height of the column is 30 inches and the distance from base to drill chuck is 14 inches when the bracket is set at its highest point. The distance from column to centre of table is five inches and the diameter of the latter is eight inches. The base dimensions are nine by 11 inches. The weight of the stand is 60 pounds. Larger stands are made with lever or hand feed wheel, to carry portable drills of $\frac{3}{4}$, $\frac{7}{8}$ and $1\frac{1}{4}$ inches capacity. Drills range from $\frac{1}{4}$ to $\frac{1}{2}$ -inch steel.

STANDARD PORTABLE DRILL.

The Standard Electric Tool Company, Cincinnati, O., is marketing a line of high power universal portable electric drills, one of which is shown herewith. They are not only constructed of the best of material, but are designed to be run off any lamp socket or

power circuit, both alternating and direct current of the same voltage. They will also operate satisfactorily on low frequency circuits, 60 cycles or less.

The Standard drills are built on the unit plan, consisting of five units, and can be easily disassembled. All armature spindles run on enclosed ball bearings. The motors are of the series commutating type, gears of high-grade hardened steel, and the make and break



Standard Bench Grinder.

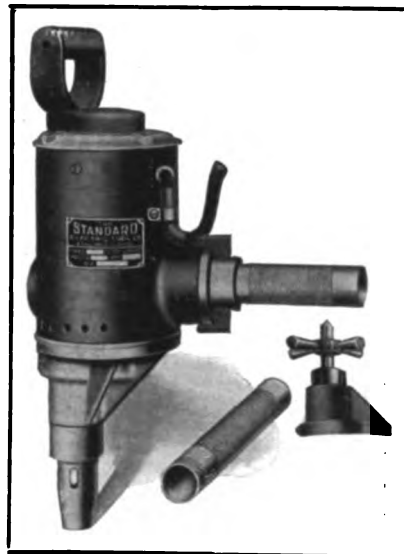
type of switch is located in the handle. Special attention has been paid to cooling and they are guaranteed not to heat under severe and continuous service. Extremely high power is emphasized in the design. In tests of the drill it has been demonstrated that it requires but one minute and 26 seconds to drill a $\frac{1}{2}$ -inch hole through two inches of steel.

Nine types are manufactured, these having a drilling capacity ranging from $\frac{1}{4}$ to $1\frac{1}{4}$ inches of steel. The reaming capacity varies up to 1-16 inch. Spade handles are supplied with four types and feed screw or spade with five. The last named come equipped with No. 2 and No. 3 Morse taper sockets, and breast plates are furnished when specified.

Each drill has variable speed, which regulates automatically up to its maximum capacity, and there is no racing. Standard tools will operate on all, no change in winding being necessary.

The company issues a booklet giving details and prices, which will be mailed free upon request.

The Standard Electric Tool Company also manufactures a number of high power, ball bearing portable electric grinders. Types 3B, 6B, 2Ba and 3Ba are similar in construction and one of these is shown in an accompanying illustration.



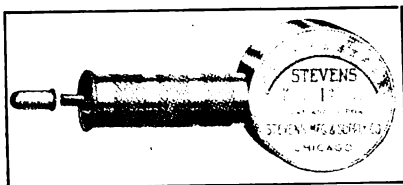
Standard Portable Electric Drill.

They are constructed to be operated on alternating or direct current and are particularly adapted for grinding small tools, etc.

NEW COMMERCIAL CAR ACCESSORIES.

Stevens Pressure Gauge.

Too much emphasis cannot be laid upon the importance of keeping the tires inflated to the pressure recommended by



the maker and for the particular size casing employed. Over-inflation is held to be as bad as under, and the best method of determining the pressure is to utilize a gauge, which is not expensive.

The Stevens Manufacturing & Supply Company, Fisher building, Chicago, is marketing the Stevens auto tire pressure gauge, which is provided with special connections to fit any tire check valve marketed, and is guaranteed to register with perfect accuracy. The indicator remains set after the pressure is registered, enabling removal of the gauge and its reading at leisure. All gauges are tested before leaving the factory and an adjusting device is incorporated for correcting any lost tension in the spring occurring after considerable service.

Cello Searchlight.

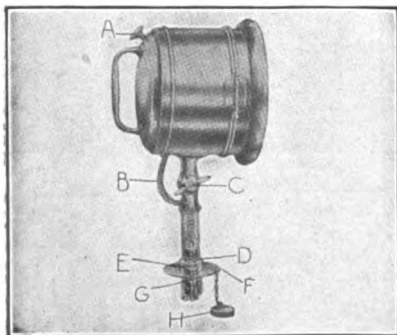
The A. S. Campbell Company, 284 Commercial street, Boston, is manufacturing the Cello Wire-Less searchlight. As the name implies the construction is without wires, to prevent opportunity of short circuits, and the design makes for easy and rapid installation. The light is equipped with the same reflector as is used in high-grade lamps.

The connection to the batteries is made through a highly polished flush deck socket, and when the light is not in service, a cap screwed on to the deck socket makes a water proof fitting. The push button A operates the lamp, and pressing down obtains a flash, while a half turn gives a steady illumination. The flexible cable is indicated by B, and C is the hinge joint obtaining movement.

The deck swivel is locked by a nut D. E is the bronze contact spring and F the deck socket, which connects to the main wiring below. The self-cleaning, positive contact is shown at G. H is the cap screw utilized when the lamp is not in service.

The design is very sturdy and can be set at any convenient angle. It is stated that ordinary type can be read at a distance of 1000 feet and that the lamp will operate economically on six dry cells. It is adapted for service with a storage battery or dynamo, and the bulb is an eight candlepower six-volt member. The finishes are: Brass, bright nickel and black nickel.

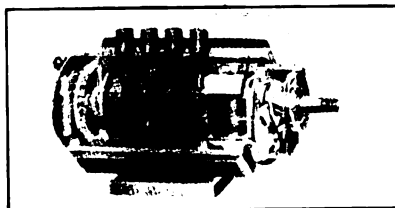
The Cello searchlight will appeal particularly to those operators of delivery cars whose trips take them into sections where the house numbers, etc., are not properly illuminated.



Hibbard Magneto.

The Grip Nut Company, Chicago, is marketing the Hibbard magneto, presenting several interesting features which differ from conventional practise. It is of the true high-tension type, operates at half engine speed with four-cycle motors, and has two armatures, each containing its own primary and secondary winding. It is of the four-pole type, four straight bar magnets being employed instead of the horseshoe design.

It is stated that almost any degree of advance or retard may be obtained, the change in the spark occurrence being accomplished by shifting the armatures and not the field or breaker box, as is used in present constructions. Another innovation is that the distributor is located inside the magneto, and the

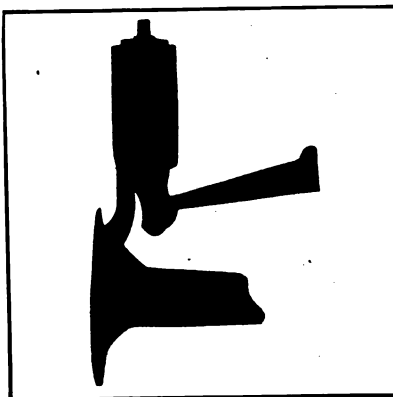


entire so-named distributor board revolves.

The breaker mechanism, carried at the end, consists of four stationary cams for the four-cylinder type, and they are made of fibre. Each point of the interrupter is carried on a separate strip of metal and the two are held together by the pressure of a spring. The shifting of the armature is accomplished by a slot in the shaft, a sleeve and a spool. A pin attached to the spool is moved backward or forward.

J. M. Shock Absorber.

The J. M. Shock Absorber Company, Inc., 210 South 17th street, Philadelphia, maker of the well known J. M. shock

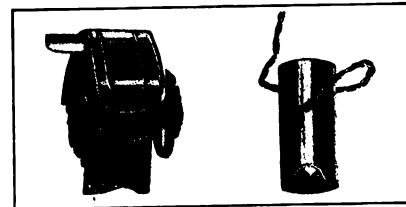


absorber, has brought out a new design termed the type No. 3, for the model T Ford car. It is based on the same helical spring principle and the same high-grade material and workmanship for which the products of this concern are noted is incorporated. The maker calls especial attention to the sliding sleeve container, the automatic oiling attachments, and the adaptability of the design to the Ford machine.

The hanger is a high-grade steel drop forging with rigid attachment for insertion and great strength is emphasized in the construction. The interior of the hanger contains a bronze bushing and at a point where the wear is concentrated. This part may be replaced for a very slight cost, doubling the service of the absorber. The new J. M. type comes in pairs for the rear springs, but front members are supplied. They are moderately priced. That illustrated is a rear design.

Little Giant Lamp.

The Harding Specialties Company, 755 Boylston street, Boston, and 1339 Michigan avenue, Chicago, is marketing the



Little Giant magnetic trouble lamp.

It is a combination device, providing as it does an inspection or trouble lamp and a magnetic lifter. It will stick to metal, and the accompanying illustration depicts the device attached to the mudguard of a car, supplying the operator with light for making a change of a casing, for example.

One of the qualities of the device is that nuts, bolts, etc., dropped in places not easily accessible to the hands or tools, can be recovered easily, as the pull of the magnet is sufficient to lift ordinary tools. The Little Giant magnetic trouble lamp is inexpensive, and as above stated, can be made to serve a number of useful purposes.

Cablephone Horn.

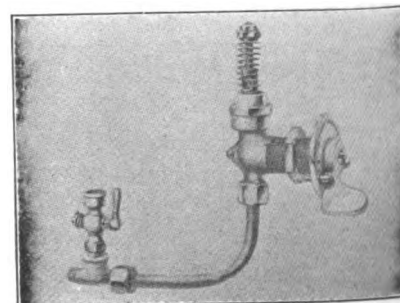
The Automobile Supply Manufacturing Company, 220 Taaffe place, Brooklyn, N. Y., maker of horns, announces a new design, which differs materially from conventional practise. It is a manually operated horn, but instead of being actuated by moving a lever, the signal is obtained by means of a cable. The Cablephone, as it is termed, is located at the side of the dash, and leading from it to the steering wheel or other convenient location, is a cable.

Auto-Valve Fuel Saver.

The Auto-Valve gasoline saver, manufactured by the Crary Company, 652 Woodward avenue, Detroit, is a simple device, comprising two parts, a control lever mounted on the driver's side of the dash, which opens and closes an automatic air valve under the hood, and a connection to the intake manifold just above the carburetor. The function of the device is to admit extra air into the intake pipe, making for a homogeneous mixture, as well as to economize on fuel, etc.

The dash lever is operated after the motor becomes warm, permitting the piston to draw in extra air, thereby reducing the amount of fuel emerging from the jet of the carburetor by lessening the suction. It is pointed out that the stream of air encountering the mixture breaks it up, and that more energy is obtained from the explosion.

After turning on the air by the dash lever the automatic valve controls the supply of air, this being according to the speed of the motor. A priming cup is included in the equipment, located near the intake manifold, and it may also be utilized for the purpose of introducing kerosene into the cylinders.



VULCAN TRUCK CATALOGUE.

The Driggs-Seabury Ordnance corporation, Sharon, Penn., builder of Vulcan trucks, has just issued a catalogue descriptive of its entire line of productions, which is now available for distribution to all who request copies. The Driggs-Seabury Ordnance corporation is one of the largest concerns of the kind in America and it has for a number of years prior to engaging in the manufacture of vehicles, produced metal parts for a number of concerns, specializing in this branch of the industry. With the experience resultant from this manufacture it began building machines and now its line includes trucks of two, three, four, $4\frac{1}{2}$, five and seven tons capacities.

So far as is practical the designs are standardized, the principal variance being in proportions, and the object is to produce machines that will have extreme serviceability and durability in all conditions of service. But the seven-ton motor is larger bore and longer stroke and the truck has a four-speed ratio gearset. All of the components used in these machines are built by the company. The material is carefully selected and the workmanship is especially accurate. The machines are subjected to very exacting tests before being passed to the sales department.

The catalogue is well designed and admirably printed. It illustrates all the principal components of a standard truck and briefly describes the principal features and qualities. In addition it includes the specifications of the various sizes of machines, and contains a series of reproductions of photographs showing them in differing services.

A. L. POPE'S NEW INDUSTRY.

Albert L. Pope, president of the Pope Manufacturing Company, Hartford, Conn., who is one of the best known men engaged in the motor vehicle industry, has, with Henry A. Lienhard, assistant secretary of the Pope company, purchased a controlling interest in the Taplin Manufacturing Company, New Britain, Conn., which produces specialties in kitchen hardware. Mr. Pope has become president and treasurer of the company and Mr. Lienhard is secretary. Arthur Goodrich, who conducted the business for eight years after his father's death, continues with the concern as vice president.

Whether Mr. Pope will retire from the industry with which he has been so long identified has not been announced, but there is reason to believe he will devote a great deal of his time, if not all of it, to the affairs of the New Britain concern.

SPECIAL FURNITURE BODY.**Stegeman 3,000 Pound Chassis Equipped for Haulage of Light Bulky Loads.**

The possibilities for specialized body construction are well illustrated in the delivery equipment recently placed in the service of the Kunzelmann-Esser Furniture Company, Milwaukee, Wis., this being produced by the Stegeman Motor Car Company of that city. This machine was developed expressly for the use to be made of it, the requirements being sufficient dimensions to carry the weight capacity of the chassis when loaded with furniture.

The demands for furniture delivery are not for large vehicle units, for but a comparatively small part of the orders sold would make a load, and operative economy would dictate the smallest machine that can be utilized advantageously. In fact the greater number of loads sent out are made up of a number of orders, the purpose being to have a full freight if possible when a machine is sent away.

Because of the necessity of protecting the furniture, much care is taken in loading and unloading, and so time is required that cannot be estimated or provided for with reference to vehicle size, and economy impels the purchase of the capacity that will suffice for all ordinary service. The experience of the Kunzelmann-Esser Furniture Company is that the average load of furniture will weigh about 2500 pounds, or about 500 pounds less than the rated load for the chassis bought.

To obtain adequate body space, however, the chassis was built with special length wheelbase, 150 inches, and on this was installed the usual cab for the driver and a body of the express type, 144 inches length and 60 inches width. This body has high sides and it is built with a wide tail gate that will considerably extend the floor area when dropped.

Within the body at either side are bow sockets, which are fitted with a series of steel bows. The bows



Stegeman 3000-Pound Chassis with Special Body Designed for the Kunzelmann-Esser Furniture Company, Milwaukee, Wis.

are removable and in the event of storm these can be quickly raised and the load covered with a tarpaulin. This construction leaves the sides of the body clear for lettering. The body is finished with brass trimmings. The side boards, the side and cross rails are all well padded to protect the furniture from damage. The body affords the capacity of a much larger machine, the wheelbase and long semi-elliptic springs insure ease of riding, and cushion tires further protect the vehicle and its load. Without radical changes and by judicious designing a very satisfactory and economical vehicle has been provided.

PUBLIC MOTOR 'BUS SERVICE.

Need of transportation service has impelled the organization of the Galion, Mount Gilead & Cardington Motor Transit Company, which is to afford a motor omnibus service to the three towns named, and which will eventually be extended to Delaware. The four towns have collectively populations of approximately 25,000, and are regarded as being as prosperous communities as may be found in Ohio. The possibilities have never been sufficient to justify the building of street railroads, and the people realize the need of the development that will follow a public service. The company is capitalized at \$20,000.

STREET SURFACE PROTECTION.

A city ordinance has been recommended for Milwaukee, Wis., which will probably be enacted, that prohibits the movement of heavy machinery of any character on wheels through the streets of the city without permission from the board of public works. When such authority is given the wheel flanges must be removed and the machines moved on plank paths that will prevent contact with the paving. The penalty provided is a fine of from \$25 to \$100. Frequent damage to the highways impelled the presentation of the measure.

A two-story addition, 50 by 300 feet, is to be made to the plant of the Walker-Weiss Axle Company, Flint, Mich.

The Delaunty Engine Company has been organized at Chicago, Ill., to build an improved form of gasoline motor. Guy Guernsey of Joliet, Ill., is president of the concern.

The Hilliard Clutch & Machinery Company, Elmira, N. Y., has purchased the business of the Elmira Pattern Works and will continue its business of manufacturing clutches.

The manufacturing plant of the Utility Motors Corporation will be removed from Chicago to Plymouth, Ind., where its production of motors for pleasure cars and trucks will be considerably increased.

TO BUILD DENBY TRUCK.

New Company Organized at Detroit to Produce Light Motor Wagon.

The Denby Motor Truck Company has been organized at Detroit, Mich., by a number of men who have been identified with the motor vehicle industry for considerable lengths of time and are generally well known. The company's officials are: Garvin Denby, president; J. Walter Drake, vice president; Arthur Webster, secretary; Edwin Denby, treasurer. Other officials of the company are: L. C. Freeman, engineer; R. P. Spencer, sales manager; R. F. Moore, advertising manager; E. L. Schumacher, efficiency engineer and production manager; M. E. McKenney, assistant sales manager; H. S. Constant, secretary to the president.

The company has established an office at 2036 Dime Bank building and has leased a building at Dubois and Franklin streets, where 20,000 square feet of floor space is available for manufacturing, and option has been obtained so that the factory facilities may be increased should the business demand.

Contracts have been made for material for the production of 500 machines, which is the minimum number the company expects to produce, with option of increasing these to provide for building 1000 vehicles if conditions justify. No statement has been made, but the company will produce a light delivery wagon that will be sold at a moderate price.

Most of the men connected with the organization were until recently associated with the Federal Motor Truck Company. President Denby was formerly secretary and treasurer of that company and is a director of the Century Electric Car and the Hayes Manufacturing companies. Vice President Drake was a director of the Federal Motor Truck Company and is now president of the Hupp Motor Car Company and a director of the Detroit Pressed Steel Company. Secretary Arthur Webster is a member of the firm of Chamberlain, May, Denby and Webster, lawyers. Treasurer Edwin Denby, who was vice president and director of the Federal Motor Truck Company, is treasurer of the Hupp Motor Car Company and a director and chairman of the executive committee of the Century Electric Car Company. Engineer L. C. Freeman was formerly with the E. R. Thomas Motor Car, the Hudson Motor Car, the Packard Motor Car and the Federal Motor Truck companies. Sales Manager R. P. Spencer, formerly held like positions for the Federal Motor Truck Company and Geuder, Paeschke & Frey of Milwaukee, Wis. Efficiency Engineer E. L. Schumacher was connected with Geuder, Paeschke & Frey and the Westinghouse Electric & Manufacturing Company, and Advertising Manager R. F. Moore, Assistant Sales Manager M. E. McKenney and H. L. Constant, were all associated with the Federal Motor Truck Company.

FRENCH MILITARY TRUCK TRIALS.

Awards in the First European Tractor Competition--English Promotion of Agricultural Motor Machinery--New Developments and Utilizations of Vehicles Abroad.

FOR more than 10 years the possibilities for the use of motor vehicles in military operations have received careful attention from practically all the large European nations, and France and Germany have established subvention systems by which the governments have available in the event of need a considerable number of the different types of vehicles that have been proven to be the most satisfactory. While such machines have not been utilized in actual warfare, they have been used in connection with extensive army manoeuvres and observed with the purpose of determining their utility. In the first trials motor trucks were tested for the heavy haulage that might be practical, and each year these tests have been made more exacting and have continued during longer periods, so that in addition to having vehicles in readiness whenever needed, the military departments have a great deal of experience that is regarded as of extreme value.

The subvention plan has been adopted in England, France and Germany, and some of the manufacturers build machines that conform to the specifications that are required by the military authorities. The purchasers of these vehicles are paid stated amounts annually by the governments that the machines may be requisitioned and placed at the service of the armies during the regular periods of mobilization and practise. The most continuous and comprehensive trials have taken place in France, and in addition to the stated periods of army service, competitive tests have been organized in which different manufacturers have been invited to enter equipment that will be of a character that can be utilized by the army.

Beginning June 29 and continuing until Aug. 12, the annual French reliability trials, conducted by the minister of war of France, will take place, which are expected to be of unusual interest. The competition is expected to be participated in by from 110 to 120 different machines, which will represent from 55 to 60 types, and four tractors of two types. The number of manufacturers who will be represented will be approximately 20, including the most prominent in the republic, among them being Balachowsky & Caire, Barron & Viale, Berliet, Blum (Latil), Charron, Ltd., Clement-Bayard, Cottin Desgouttes, De Dion-Bouton, Delchaye, Dewald, La Buire, Mors, Panhard & Levasor, Peugeot, Renault, Rochet-Schneider, Saurer and Schneider. Of these the Balachowsky & Caire entries will be tractors.

The rendezvous for the trials will be at Versailles, and the tests will be made in different directions, which is expected to afford better results than were a

long run made over a route that would practically be a circuit. The field is the largest that has ever participated in such trials, and an unusual degree of interest obtains from the fact that the trucks and tractors will be competing and the relative qualities of each type will be observed with extreme care.

Four-Wheel Drive Tractors. A great deal of interest obtains in the possibilities with four-wheel driven tractors, prominence being given to the results of the trials from March 2 to 29, which were organized by the French minister of war. The entrants were divided into two classes, light and heavy, and in the former classification the successful competitors were placed as follows: No. 1, Latil tractor No. 9; No. 2, Chatillon-Panhard tractor No. 2; No. 3, Chatillon-Panhard tractor No. 1. In the heavy class the places were awarded thus: No. 1, Renault tractors Nos. 11 and 12; No. 2, Latil tractors Nos. 7 and 8; No. 3, Panhard tractors Nos. 3 and 4; No. 4, Schneider tractors Nos. 13 and 14.

The conditions in which the tests were made were extremely unfavorable, there being a great deal of bad weather and because of the previous trials being in more favorable circumstances results could not be compared with justice to either the entrants or the war office. The degree of traction obtained with the wheels fitted with rubber tires was approximately 0.5 per cent., but when the wheels were fitted to insure traction haulage was possible in practically all conditions. The speed regarded as maximum for the tractors was approximately 18 kilometers, and for the loaded trains from 10 to 11 kilometers. Some of the tractors were fitted with steel wheels, and careful observation of this equipment during the trials demonstrated that there was every reason to believe that there would be excellent results during more extended periods.

English Agricultural Motor Trials. The Royal Agricultural Society of England is promoting an exhibition of motor driven agricultural machinery to be held later in the year, which is planned to be of considerable proportions. Foreign manufacturers generally will be invited to participate. The purpose is that the exhibition shall include tractors and differing forms of machines, and there will be a series of trials, both singly and in competition, which will demonstrate capacities and economies in varying conditions of operation.

The proposed exhibition is given the approval of representative publications, and there is a disposition to stimulate interest from the industry because of the very evident impetus that would be given and the widespread interest that would be created. The Eng-

lish manufacturers are urged to take as active part as is possible and are reminded of the prestige that would be lost were foreign machinery to afford the best results as a whole. The desirability of permitting the use of the machines for the specific work they are designed is emphasized, as is the fact that fuel economy is by no means the exact measure that should govern determinations. The industry is impressed with the fact that cheap machinery, because farming tractors and other implements are used intermittently, all else being equal, should be a very potent factor. While it is agreed that the limited time of the trials that can be made of the machines will not completely demonstrate their usefulness in agriculture, there is no doubt that these will be of material value in establishing the utility of motor driven apparatus.

Motor Apparatus Exhibitions. The possibilities for developing business from fairs and shows of agricultural societies have attracted a considerable number of the English manufacturers of motor vehicles and agricultural machinery, as well as those who produce equipment for municipal service. These are held at different times during the year between May and October and are regarded as institutions by a very large proportion of the people. Those thus far held have had departments of considerable proportions in which all kinds of wagons, trucks and machines have been shown. While these have been practically displays, with such demonstrations as is possible without actual competition, a large measure of attention has been attracted that will, it is believed, justify the preparation of the exhibitors necessary for participation.

Commercial Motor Users' Association. Each year the Commercial Motor Users' Association, an English organization that is devoted to the promotion of the use of motor vehicles, has what is known as an annual parade, and June 1 the eighth parade took place on the Thames Embankment in London. The association endeavors to stimulate the drivers of machines to careful care and maintenance by offering prizes for the men whose vehicles reflect their work and attention, and to owners for differing conditions that are creditable.

The machines were assembled in the early morning, and were assigned to places and remained there until they could be examined by the judges and the drivers could be given stated examinations that demonstrated their knowledge of mechanical construction and of operating conditions. After the judges had inspected the machines and determined their ratings for the competition the awards were decided by the committee and the drivers notified. The prizes were particularly numerous and one of two pounds was awarded to the driver of a luggage van owned by King George. After the distribution of the award cards the vehicles were dismissed, although some elected to remain longer that the machines might be viewed by spectators. A throng of people visited the Embankment and witnessed the parade.

In all 509 machines were shown in the parade and the estimated value was 322,000 pounds, or approximately \$1,600,000. Of this number 384 were driven by petrol engines, 112 by steam and 13 by electric power, this being an increase over the 1913 parade of 90 petrol, 39 steam and eight electric machines, a total of 137. The greatest ratio of increase was of the electric wagons, there being five exhibited during the parade of the previous year. The attention of the war office was directed to the parade, and representatives examined the machines carefully for the collection of information that would be useful to the government should it have occasion to utilize a large number of motor vehicles.

Alcohol as Motor Fuel. The Alcohol Motor Fuel Committee, which is associated with the Royal Automobile Club of England, is making an appeal to the people and urging upon the government the necessity of having at its disposal a fund that will at least amount to 6000 pounds for a period of five years, provided that there shall be the investigation and determinations relative to the use of alcohol that its importance as a fuel justifies. Emphasis is made that there will be distinct benefit to the people as a whole through establishing the utility of alcohol, and from this ground the government is appealed to to provide the means for a careful and scientific investigation that will establish definite possibilities.

Systematizing London Traffic. The systematization of the congestion in the streets of London has been carefully studied by various committees and organizations with a view of increasing the speed of vehicles and improving the safety of the people, and while numerous reports have been made and suggestions offered, apparently no solution that is regarded as practical has been reached. The only possibility that can be developed appears to be the utilization of as many vehicles as can be used during the nights, and this would necessarily mean a material change in methods and systems that now exist. While there is no doubt of the benefit that would obtain there appears to be no inclination of the different civic and municipal bodies of influence to take the initiative in this direction. The control of the traffic is at present entirely in the hands of the police, and this organization must deal with conditions as they are, for the commissioner cannot require any change such as has been suggested, although there is no question as to the authority for regulation of the use of the streets.

Electric Service Wagons. Arrol-Johnston, Ltd., Paisley, Scotland, has begun the production of light electric wagons in types that are available for both public service and general use, the chassis being designed for loads of 750 and 1000 pounds respectively. The chassis are driven by worm and gear and by double chain reduction, the power transmission systems being such as are generally used in American built electric wagons. There are no in-

novations, conventional practise being followed, and these are equipped with Edison batteries. The maker of these machines has produced several types of pleasure cars that have given excellent satisfaction, and has now turned to manufacturing wagons that are extremely attractive and for which there is every reason to believe a market is rapidly developing.

The success with electric vehicles in America has aroused much interest among English engineers and because of the very general utilization of electricity for lighting and power, and the possibilities for producing current at low cost, as well as the large proportion of good highway, there is the best of reason for the belief that there is a very promising market for electric machines. Confidence in this market and knowledge of the advantage of domestic manufacture has impelled this firm to begin building these wagons.

Military Supply Tank Wagon. The Spanish war office has provided an equipment to be used with the trucks that may be utilized for military operations, this being a Benz truck chassis on which is installed a tank body divided into three compartments. The tank is heavily built to withstand rough usage and it has three large filling caps. It is intended to fill the sections with gasoline, oil and water, these supplies to be distributed en route to different machines as required, so that there need be no delay because of the lack of fuel, lubricant or water. Each compartment is provided with a pump for filling from stores or tanks and the distribution is made from convenient outlets at the sides and rear. The chassis has a 50-horsepower engine and a very large radiator to insure cooling. So far as is known this is the first equipment of the kind developed for army use, though in many details it is similar to tank wagons that have been constructed for private service.

New Motor 'Buses for Berlin. The Hochbahn Omnibus Gesellschaft has been organized at Berlin, Germany, with capital of 200,000 marks by those interested in the Elevated-cum-Underground Electric railroad, and it will be operated in connection with the railroad system, serving sections of the city and suburbs not reached by the railroad lines. The company has contracted for a series of German-Daimler chassis that are equipped with omnibus bodies. The omnibuses are of the two-deck type, with seating and standing capacity of 39, the inside seats being transverse and the deck seats longitudinal. The chassis have four-cylinder motors, developing 35 horsepower at 850 revolutions, a cone clutch, a gearset with three forward speeds driven by silent chain and reverse driven by spur gears, and the drive is by worm and gear wheel. The first series of these vehicles is now in service.

Trial of German Walking Motor Vehicle. William Goebel, an engineer of Breslau, Germany, has invented what may be termed a walking motor vehicle in that its progress is by the means of six runners that are raised and placed in contact with the ground alternately, the runners adhering to the ground by

friction, and the forward motion being what may be likened to a slide or glide. The runners are operated by a motor, the power from which is greatly reduced. A test was made in the presence of a large number of interested government and military officials, and the one that excited the greatest interest was climbing over a pair of inclined planes, practically at right angles, forming a pyramid about 30 feet high. The intention is to test the machine with a pair of much higher planes, fitted with an army transport body, and should it then operate successfully the German government will develop it for transport work, as it is believed that it might be practical over rough ground.

Road Transit of Mail. The general postoffice department of the British government has given a great deal of study to the possibilities of improving the transportation of mail by motor vehicles with a view of affording more frequent deliveries in places where such service is demanded, though limited if the railroads are depended upon, and economizing the cost of haulage. Motorcycles, cars and vans are utilized, according to the requirements, and with these mails are carried with greater rapidity, the remote localities are much better served, and the organization for the handling of the mail outside of the cities can be the better systematized. While the long hauls are done by railroad, for the express trains make fast and satisfactory runs between large cities, and there is little probability of any change in this method of transportation, hauls of considerable distance are made by motor van between important points with a large measure of satisfaction. One of the most recent contracts for mail haulage was made by the British Automobile Traction Company, which is now conveying all of the matter sent between London and Cambridge by road. Cambridge is 58 miles from London and there are several good routes on which good time can be made.

The general postoffice has acquired a considerable equipment of its own that is used for differing purposes, but most of the haulage is, and probably will be, done by contract, because of the impracticability of the government owning and maintaining all the machines that would be needed sufficiently near the localities where they are or would be used without incurring enormous expense. That is, garages would necessarily be located where they could serve the best purposes and be reasonably economical, and yet for the convenience of the drivers and to lessen operating cost the machines must be kept as near the routes on which they are used as is practicable.

The results with the machines owned by the government have been very satisfactory as a whole and the value of thorough organization has been exhaustively demonstrated, for the service must be constantly maintained at extreme efficiency. But with contract haulage the contractor has the responsibility of affording the service, and is expected to make a reasonable profit from a price paid that is governed by public competition.

SULLIVAN MODEL G2 3000 POUND TRUCK.

CONCENTRATING its endeavors on a single type of motor delivery wagon, designated as model G2, the Sullivan Motor Car Company, Rochester, N. Y., has standardized this machine and is perfecting a nation-wide selling organization to market it. The policy of the company was determined after careful investigation of the requirements of business men, and analysis showed that the greatest number used vehicles of comparatively small capacity, moderate speed and made deliveries over wide areas.

The company is composed of men identified with the vehicle industry for 32 years. The founder is T. J. Sullivan, who was of the firm of Hughson & Sullivan, established in 1882. When Mr. Hughson retired in 1889 Mr. Sullivan's brother, D. E. Sullivan, entered the firm, which became Sullivan Brothers. The concern developed a widely known wagon and carriage building business, that is continued today. Later on George T. Sullivan, son of the senior partner, was admitted to the firm.

The Sullivan Motor Car Company was organized in 1910 with D. E. Sullivan president and treasurer, H. H. Sickels vice president and George T. Sullivan secretary, and manufacturing was begun in the carriage factory of Sullivan Brothers. The first machine was produced in the spring of 1911.

In designing model G2 extreme care was taken to produce a machine that would have every desirable quality, to standardize it and use such materials that owners would not only have the service of the builder, but be assured of the resources and service of the makers of the principal components. That is, the use of specialized parts and units means practically the service of an industry rather than of a firm.

The claim is made for the machine that it represents the highest quality that can be produced. It is exceedingly conventional, but it is built with regard for proportions, strength of metals, conservation of power, elimination of friction, positive lubrication throughout, protection of all moving surfaces in con-

tact and with large factors of safety in all parts.

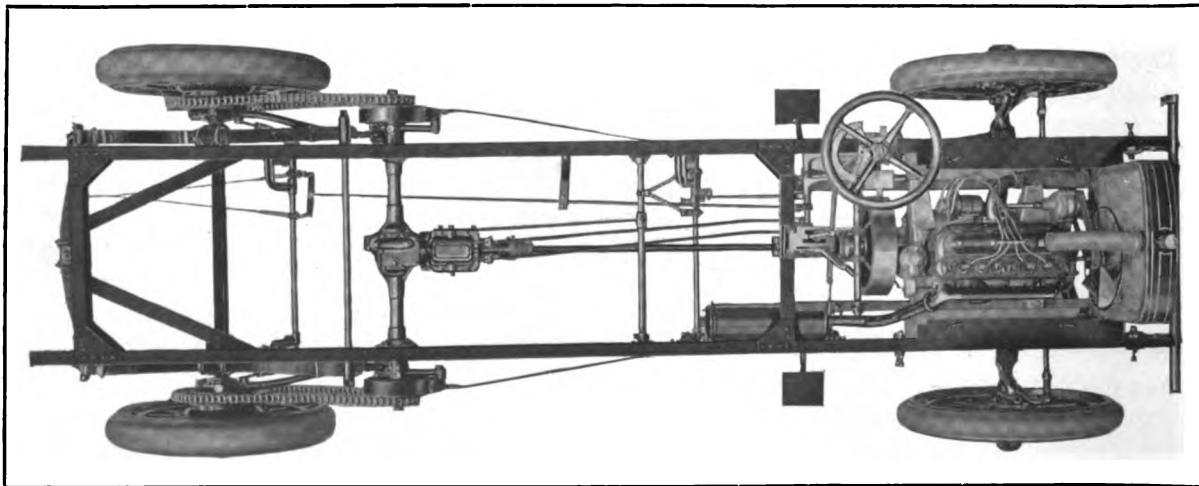
Construction of the Motor.

The rating is exceedingly conservative. The motor, for instance, is rated at $22\frac{1}{2}$ horsepower by the S. A. E. formula, and 25 horsepower is claimed by the builder, although the engine has repeatedly developed in excess of 30 horsepower when tested. The motor is a vertical four-cylinder, water-cooled L head type, having cylinder bore of $3\frac{3}{4}$ inches and stroke of $4\frac{1}{2}$ inches, with the valves at the right side. The cylinders are cast en bloc with the water jackets integral, there being large spaces and easy turns to insure free circulation of the cooling fluid. The block is cast with the head open, this being closed with a large plate, with which is incorporated the water outlet manifold, that is retained by a series of cap screws. The water inlet manifold is at the base of the jacket and the water is forced around the cylinders, positively cooling them. The block is webbed at the centre and ends on the valve side, so that the valve springs and stems may be fully protected by cover plates.

The crank case is cast in two sections from an aluminum alloy, the upper carrying the three main and camshaft bearings, and the lower being divided by a horizontal web that separates the oil reservoir from the crank chamber. The web contains four pits immediately beneath the crankpins. The pistons and cylinders are carefully ground and fitted. The crankshaft and the camshaft are the three-bearing type, the former having unusually long journals of special anti-friction metal, and the latter bearings of phosphor bronze. The connecting rods are I section, carrying big end bearings of anti-friction metal, and phosphor bronze bearings for the wristpins. The timing gears are large and have wide faces. The valve stems operate in guides mounted in the cylinder block, and the tappets are a mushroom type that are actuated in guides attached to the block flange. The tappets are fitted with adjusting screws and nuts.

The motor is lubricated by a self-contained splash

system. The oil is drawn through a filter in the reservoir by a plunger pump and forced through a tube that discharges at four leads to the four oil pits in the crank-case bottom



Top View of the Model G2 Sullivan Chassis with Capacity of 3000 Pounds.

web, and from these the lubricant is distributed over the main and camshaft gearings, wristpins, timing gears, valve tappets, piston and cylinder walls by splash. The excess oil is drained to the reservoir. An indicator shows the level of the oil in the reservoir. Means are provided for draining and cleaning the reservoir. The lower half of the crankcase may be removed for inspection or work.

The motor is cooled by a thermo-syphon circulation of water through the cylinder jackets and a large radiator of the vertical tube construction. The radiation is supplemented by a large fan mounted on an adjustable bracket driven by a flat belt from a pulley carried on the crankshaft extension. The cooling is sufficient in all conditions of operation. The fuel is carburetted by an automatic float feed type carburetor that is claimed to afford a sufficient mixture at any engine speed. The ignition is by a Bosch high-tension magneto, the wiring being exceedingly simple because the spark is fixed. The control of the motor is by varying the supply of fuel, either by a hand lever on the top of the steering wheel or a foot accelerator. The motor is governed to a speed of 18 miles an hour, and the governor is sealed.

Clutch and Driving System.

The clutch is a leather-faced cone engaging with the recessed flywheel, and the cone is fitted with flat springs beneath the facing that insure ease of engagement. A clutch brake prevents the clutch spinning when disengaged, and makes for certainty of speed changes without possibility of gear stripping. The motor and the clutch and the radiator are mounted in a sub-frame to obviate stresses from chassis distortion.

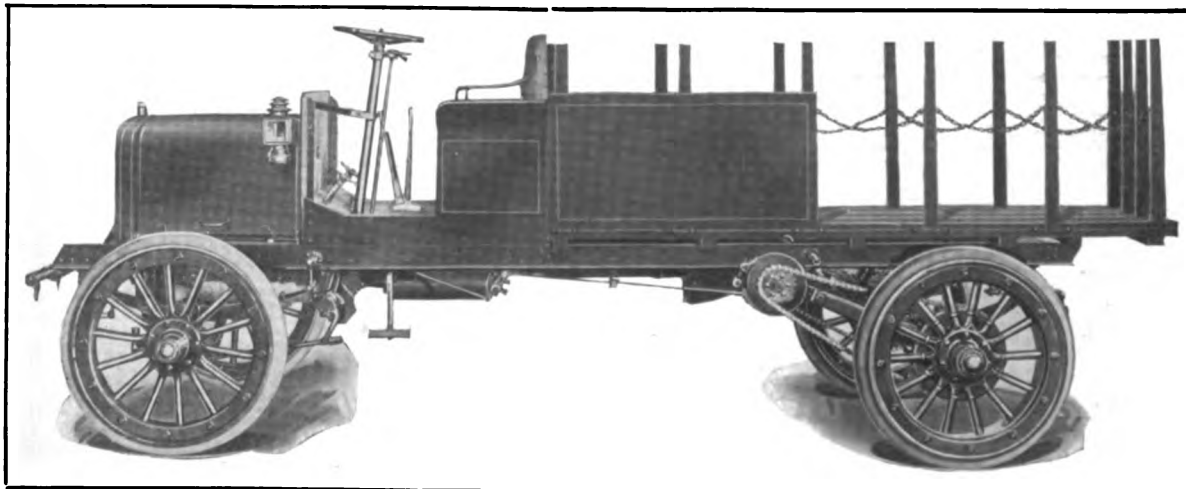
The clutch shaft is coupled to the main shaft by a telescoping sleeve and there is a universal joint at either end of the main shaft, this insuring against side pressure leverage through loss of alignment. The jackshaft and the transmission gearset are assembled as a unit, the jackshaft, of the full floating type, being mounted in heavy hangers. The gearset is a selective construction, affording three forward speed ratios and reverse. All the shafts and gears are of nickel steel, are of large proportions and are carefully heat treated. The shafts are all mounted on New Departure ball bearings of ample size. The jackshaft is carried in spherical bearings to protect it against chassis strains. The final drive is by side chains.

The frame is a pressed steel channel

section of 3-16 stock, five inches width, and all cross members are reinforced with heavy gussets and diagonal braces. The frame is suspended on semi-elliptic springs forward and a half platform of semi-elliptic springs at the rear. The frame is carried between the rear springs, this lowering the centre of gravity and affording the greatest steadiness to the body. All the springs are fitted with heavy shackles and large bolts, and the spring eyes are bushed and provided with generous grease cups for lubrication. The front axle is an I section and the rear axle a heavy drop forging with the spring seats integral. The driving thrust is taken by radius rods of I section construction.

The driving chains are a quick, detachable type, and the front and rear sprockets are attached by bolts, so that they may be quickly changed or replaced. The wheels are built with 14 spokes each, of second-growth hickory, and are mounted on roller bearings on heavy axle spindles. They are fitted with 36 by three-inch tires forward and 36 by four tires rear. The wheelbase is 129 inches and the tread 56 inches. The steering gear is unusually heavy and the linkage is high above the road surface and well protected. Steering is by a large hand wheel at the left side, and the clutch and service brake are operated by foot pedals. The gear changing and the emergency brake levers are at the centre of the footboard. The service brake is external contracting on drums on the jackshaft, and the emergency brake shoes expand within drums on the rear wheels. Both sets of brakes are equalized.

The chassis is equipped with a seat, oil dash and tail lamps, horn, jack and the usual tool kit. These chassis will be fitted with any form of body desired, either made to standard dimensions for platform and open and enclosed express types, or built to specification. The standard bodies have loading space 102 inches length and 44 inches width, but special bodies 120 or 144 inches length and the same width can be supplied. The stake platform body may be made any width by raising it on eight-inch bolsters, but the standard is 102 inches length and 48 inches width. The company is prepared to place its building experience at the disposal of its customers who may desire special bodies for unusual purposes.



Model G2 3000 Pound Sullivan Chassis Equipped with a Standard Stake Body.

STATE'S FIRST TRUCK.

Rhode Island Purchases Machine to Haul Supplies for Penal Institutions.

The state of Rhode Island and Providence Plantations has become possessed of one motor truck, the first machine of the kind that it has owned, although there are more automobile vehicles in the commonwealth in proportion to the population than in any other in the union. The state has owned several automobiles, but until recently no thought was given to the economy of motor truck transportation.

The state prison, state house of correction, state insane asylum, state reform school and other institutions of similar character are located at Howard, a railroad station and post office in the city of Cranston, six miles from the centre of Providence, and about two and a half miles from the Providence line. There is no direct railroad communication and for more than 30 years all of the supplies used, and a large part of the products of prison and school shops have been hauled over the highway.

Stipulation is usually made for delivery at the institutions when contract is entered into by the state board of charities and correction, but the transfer work has been done by horses and wagons, the expense for these reaching a large sum annually. The conditions for haulage are ideal and despite this fact not until June was a three-ton Alco truck bought and installed in service. This machine is believed to be of sufficient capacity to do the work for which a half dozen animal outfits were required, and the intention is to transport a large part of the supplies from Providence to the penal colony, as well as haul products from them to that city for shipment.

The chassis is fitted with a specially built body that has a roof extension that forms a cab for the driver.

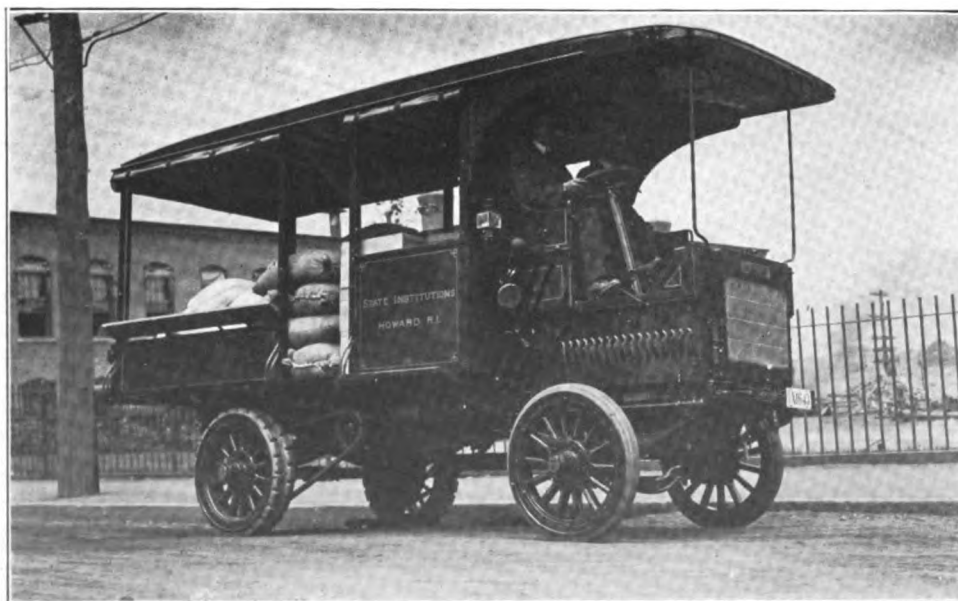
This roof is supported by stout stanchions with half panels and side gates for convenience in loading and discharging freight. The rear half of the body has much lower panels than the forward, and these are equipped with flareboards so that a bulky load may be carried. Side and end curtains afford ample protection. The machine will make four or more trips daily the first week of each month when the food supplies are hauled, and the number made the remainder of each month will depend upon conditions.

RHINELAND MANAGER HERE.

General Manager Paul Bruhl of the Maschienenfabrik-Rheinland, A. G., Dusseldorf, Germany, maker of Rhineland ball bearings, is in America for the purpose of inspecting the American branch, the Pafnir Bearing Company, New Britain, Conn., and to visit some of the large automobile factories and machine works for the purpose of securing information relative to worm driven machines and worm and gear construction. He is accompanied by Stuart Shepard, the American manager. Mr. Bruhl is an expert in ball bearing engineering, having been engaged with Prof. Stribeck in research work in Europe that largely resulted in the development of ball bearings and the perfecting of their manufacture.

INTERMOUNTAIN FREIGHT RATES.

A decision of material interest to motor wagon and truck manufacturers was announced by the United States supreme court June 22, in which the court held that a railroad shipping from an eastern point to a destination east of the Pacific Coast could not charge more for the service than the through rate to the Coast. The case was that of railroads that had applied to the Interstate Commerce Commission to charge more than the through rate. The railroads had in instances of this kind made the rate the through tariff plus the local tariff back from the Coast to the destination, this making the charge for hauls of this character considerably in excess of the through rate. The railroads wanted this policy legalized and the commission refused it, and the railroads took the question to the supreme court. The court maintained that the commission had not the authority to make a blanket rate, but did have the right to prevent discrimination. This decision will result in a material reduction of freights shipped from the East and will benefit Western buyers.



The First Truck Bought by the State of Rhode Island, Used for General Haulage Between Providence and the State Institutions at Howard.

GAS ENGINE LUBRICANT QUALITIES.

ENGINE lubrication is vitally important, because thorough lubricity is necessary to insure satisfactory operation and protection against wear. What will afford a sufficient degree of lubrication is very generally a matter of uncertainty, even with engineers and gasoline motor experts. The average owner or driver will judge from casual or incidental operation. He will seldom have the time, the inclination or the scientific knowledge to systematically study the qualities and characteristics of lubricants, and while one may assume that practical experience is a safe foundation for judgment, there is no question that the determinations of actual value can only be made from careful laboratory tests, in which each factor is considered.

The paper on "Characteristics of an Automobile Engine Lubricant", which was presented at the mid-summer meeting of the Society of Automobile Engineers at Cape May by Prof. David L. Gallup, head of the gas engineering department of the Worcester, Mass., Polytechnic Institute, was of especial interest in that it discussed the relations of different factors generally accepted as indicative of lubricating quality. This paper can be read with much profit by every person owning or using a motor vehicle, and with the assurance that it is without prejudice or bias. The paper follows:

It may be believed by many that a discussion of anything relating to the characteristics of an automobile engine lubricant is not only unnecessary, but undesirable, for the reasons that it has been taken up so many times before, has in all probability been sufficiently well covered and also that further consideration of it may result in needless confusion. In the minds of a few, at least, recent developments have led to the belief that if ever there has been an established verdict regarding the proper qualifications for an automobile lubricating oil, it is rapidly becoming less recognizable, due to the influence of commercialism upon engineering. Various articles have appeared in the technical papers from time to time in which conclusions have been given concerning the proper fire, flash, viscosity, gravity, color, and cold tests and origin of oils best suited for lubrication of an engine, but seldom if ever have they been in agreement even as to essentials. The question may be immediately and properly asked why this discrepancy exists. It is undoubtedly a bold statement to make, but is nevertheless capable of almost proof, that many oils are made to appear valuable as lubricants by reasons made to fit the case. In particular, if a manufacturer has available an oil of certain characteristics in such quantities as to make sale of it desirable, it is often necessary for him to invent reasons why that particular oil is superior to others and well adapted for the purpose under discussion.

It is not the intention of this paper to state definitely of what numerical values the various physical characteristics should be, since it is believed that this is not possible, but at the same time it is claimed that it can be stated what they should not be. Further, it is the author's conviction that in the case of modern oils of established standing, certain characteristics may be eliminated from consideration entirely as they in no way affect the qualities of lubrication. These are the fire, gravity and color tests, the locality from which the oil comes and indirectly the cold test. Before going into an explanation of the reasons for this, let certain things be recalled to your minds.

"Gravity", when referring to an oil, indicates its weight, using water as a standard; is usually given in Baume and varies ordinarily between 25 and 32 or 0.90 and 0.87 specific gravity.

"Cold test" is indicated by the temperature below which the oil ceases to flow or exist as a fluid.

"Flash test" is the temperature at which the vapor given off by the oil takes fire.

"Fire test" is the temperature at which the oil itself takes fire and is of course above the "flash test" (usually 30° to 50°F.).

"Color test" is determined by the eye and needs no explanation.

"Viscosity" is a measure of the thickness of an oil and is measured by a "viscosimeter" in what might be termed an arbitrary way, being indicated by a numerical value. The vari-

ous oils used in automobile lubrication vary in viscosity from 150 to 2000.

"Origin" in this case refers to the geographical locality in which the oil is found.

Gravity.

Taking up now the explanation previously referred to, let "gravity" be discussed in order to determine just what its influence is upon the oil as a lubricant. Viewed alone, it must be admitted that a variation from 0.90 to 0.87 can have little if any effect upon the oil in its ability to penetrate recesses or clearances according to whether it is light or heavy. Unless there be some link connecting the gravity of an oil with certain chemical characteristics which determine its lubricating value, it cannot be said that the value of gravity in any way determines whether an oil will stand up under severe heat. As a matter of fact, the only argument which has ever been used in connection with the effect of gravity is as indicated above, but as can be seen under the severe conditions of heat, speed and pressure, this slight difference can in reality have no determinable influence.

Cold Test.

The "cold test" value is indirectly related to an oil in regard to its value as a lubricant for the reason that oils having relatively high cold tests may give trouble in cold weather, but only when the engine is in the process of starting up. Immediately upon functioning, the engine imparts heat to all surrounding portions, so that at best it could be but for a short time that there would be possibility of insufficient lubrication. As to there ever being a time when oil on the bearings in some form did not exist, this is hardly conceivable. The only real detriment would be in the amount of power necessary to turn the engine by hand, mechanically or electrically, which might be of sufficient magnitude as to actually prevent this. This consideration, however, is hardly worth discussion unless an oil has a cold test above an ordinary temperature such as 20° F. and a viscosity relatively high.

Flash Test.

The "flash test" in an oil of reputable manufacture is without question one of if not the most important characteristics. It is on this in reality that the life of the oil depends. Aside from its other qualities as a lubricant, the flash test, if less than a certain value, may preclude entirely consideration for use in an automobile engine. No one would seriously consider for a moment the use in an internal combustion engine of a so-called "machine" oil. The gravity, viscosity, color and cold tests might, however, be in agreement with many brands of automobile lubricants. The distinction is solely in the value of the flash test. The ordinary man reasons that this is as it should be, since the temperature to which the oil is subjected would affect the oil. What is particularly interesting, though, is that some manufacturers lay great stress on the fact that the oil in an automobile engine should not have a high flash test, maintaining that it should be low in order that the oil may burn up cleanly. Is it out of place to ask right here, what is the function of a lubricant, to lubricate, or burn up and furnish heat for the engine? If the latter, why not go a step further, using an oil such as is used on journals, lathes, etc., having a flash low enough to guarantee complete combustion? The argument concerning "burning up clean" has come to the front in a very decided manner recently, and is exceedingly unfortunate, for it would seem that actually it has been made to fit the oil rather than to obtain an oil which satisfies certain conditions primarily laid down as essential.

The proper and sole function of an oil should be to lubricate. It can be distributed in a way so as to be used over again or in a manner which will provide for its complete utilization, and this by wearing out or evaporation, but not by burning.

To return, an oil is made up of certain constituents, the combination of which gives to it definite characteristics. If any one of these is changed or removed, that oil has a different lubricating value. Hence, any oil which is subjected to a temperature exceeding the value of its flash test, will have certain portions distilled or burned off, with the result that the oil has deteriorated as a lubricant. Therefore, the logical conclusion is that, other things being equal, the flash test should be as high as possible, in order to be proof against this deterioration. The exact value of this is, of course, difficult of determination, and will need to be governed largely by experience. Results of tests extending over a long time have emphasized the fact that it should not be less than 400° F. approximately. An oil having a lower flash test is burned away rapidly and needs to be replaced by an additional supply; it is very often the case that even though the cost per gallon of the low flash oil is less, the total expense for oil alone per year is more than would be the case with a more expensive high flash oil; saying nothing of the injurious effect which the inferior oil has upon the bearings.

Theoretically, an oil may burn up cleanly; practically, no such thing exists. Oil is composed of H and C, and in order to burn "clean" must have complete combustion, which must be brought about by the proper proportion of air and the correct temperature. These demands are almost impossible of fulfillment in ordinary operation. With gasoline a very considerable range of proportion and temperature may exist without seriously impairing the efficiency of burning, but this is not so with an oil used as a lubricant. On the other hand, it is inconceivable when an analysis of conditions is made, to

consider that no portion of a lubricating oil is burned away in an automobile engine; hence the aim should be to make whatever amount is burned as small as possible.

Running Temperature.

In passing, it might be well to state that means should be provided in any automobile engine for keeping the lubricating oil as cool as possible. This refers particularly to the oil in the crankcase and results from the fact that a hot oil cannot be depended upon for lubrication under severe conditions to the extent that a cool oil can. Hot oil is constantly giving off vapor, which in turn reduces the oil to nearer its basic constituents, resulting in a very different lubricating value. A few makers of engines are aware of this fact and are making provisions for it.

Filtration.

Another important item for consideration is filtration. In any "over-and-over" system provision should be made for not only "straining" the oil, but "settling" it, since straining merely takes out the heavier particles of foreign matter and does not remove that which is in suspension. In all probability a form of settling basin, with a less rapid rate of circulation, would be of material assistance.

Fire Test.

Coming now to the "fire test", it is maintained that since this is always higher in value than the flash test, and since above the latter an oil is changing in its characteristics and bears little resemblance to itself under normal conditions, there is no need of consideration of this item. The flash test of a given oil determines for that oil its value as a lubricant.

Color Test.

The "color test" fortunately is not given the prominence it formerly had, but is still receiving more than its share of attention. In the early days of automobiling, engine troubles were frequent, and after being referred to the carburetor or ignition system were eventually diagnosed as due to the oil. This was so because it was the one thing about which the least was known and because the presence of carbon was felt to be a natural result of impurities which caused the dark color present in almost all oils of high flash. Therefore, in order to remove this unfortunate quality, filtration was resorted to and to such an extent that the modern automobile oil is very light in color and hence supposed to be free from carbon. In any oil of reputable make, carbon always exists, but chemically. In combustion this may show up as free carbon due to improper combustion or pass off with the products of combustion. Mere filtration does not necessarily make an oil "carbon proof". Further evidence of this fallacy is the fact that, although lubricating oils in the past few years have been supposed to improve in quality, and hence likely to cause less trouble from carbon deposit, the latter evil has been much more in evidence than ever before. This is caused by a deteriorating quality of gasoline, which demands much more accurate carburetor adjustment if proper combustion is to be assured. This is due to the carbon in the gasoline, which by the way exists in it in the same way as in a lubricating oil, i. e., chemically and not free.

The reason for all this discussion is the fact that filtration beyond a certain point has a detrimental effect on the oil, since it reduces its flash point; and hence should not be carried to the stage where the oil becomes almost colorless. Personal tests have been made with very dark oils of high flash with perfect results as far as carbon deposit, effective lubrication and expense of operation are concerned; in the majority of cases, except when conditions preclude viscosities such as are attendant, such oils are much better lubricants for an automobile engine. (In the foregoing, it is of course assumed that oils from reputable and well known manufacturers only are being considered.)

Viscosity.

With reference to viscosity, it must be admitted that this characteristic is open to more legitimate variation than any of the features heretofore mentioned. The viscosity of an oil is an indication of the ability of the oil to maintain itself as a lubricant under severe conditions of speed, pressure and temperature. It is also to a certain extent an indication of the friction of the oil itself; that is, a higher viscosity means a higher internal friction, and vice versa. This may be so definite a quality that the increased friction will develop enough heat to raise the temperature of the oil to a point where the friction would be equal to that offered by the less viscous oil at a lower temperature. Generally speaking, a viscous oil will stand higher temperatures and hence have a higher "factor of safety" for internal combustion engines. The only detriment is that in many installations the customary clearance between piston and cylinder is so small as to preclude the use of any but a very thin oil. This is in reality somewhat unfortunate because in the light of the preceding statements, a thicker oil, i. e., more viscous, would be much more satisfactory for heavy duty, and could be used with complete satisfaction if slightly more clearance existed between piston and cylinder, which would not result in "piston slap" in any greater degree than in the former case. This argument is augmented by the adoption of the latest designs of pistons which are practically proof against scoring and "piston slap".

However, since practise varies so, it is necessary to provide a variation in the specifications for viscosity and this variation should be between the limits of 175 at 70° F. and 150 at 212° F. Tagliabue (approximately). Below these values the oil is so thin that continued use of it under severe conditions will cause it to break down; above the oil is so thick as to render its lubricating value doubtful until after the engine has been subjected to some minutes of running; in the meantime damage may have resulted.

Preference should be given the heavier bodied oils, since the engine will be more flexible at low throttles and speeds (due to less leakage) and permit of more "abuse" than oils which are on the verge of breakdown.

Origin.

The last item in this discussion is that of origin. Little need be said in this regard other than the statement that just because an oil was drawn from a certain locality does not necessarily prove its superiority over other oils from other parts of the world. It may be true, of course, that nature does not provide oils of the proper characteristics in all localities, but this should not be used by manufacturers and dealers in oil to discredit all brands except those found in their particular field.

Conclusion.

In conclusion, a brief resume will give the following characteristics of an oil best adapted for use in the ordinary form of automobile engine:

Cold test: Not above 25°F.
Flash test: Above 400° F.
Fire test: Immaterial.
Gravity test: Immaterial.
Color test: Not necessarily material.
Viscosity test: Between 175@70° F. and 150@212° F. Tagliabue.
Origin test: Not necessarily material.

The above characteristics when possessed by most oils of reputable manufacture will insure proper operation under all conditions of loading, speed and temperature, will be proof against use in excessive quantities, will necessitate the least outlay for both oil and repairs to engine; will guarantee flexibility under the most varied conditions, all of which together represent all the demands which can be reasonably made upon a lubricant.

PACKARD LUCK IN 13.

The purchase of 12 three-ton trucks by Marshall Field & Co., Chicago, Ill., was the 13th order that has been given by that firm to the Packard Motor Car Company, and when the order is delivered the purchaser will have 33 Packard machines in service, the first being accepted in December, 1908. The trucks are used for all forms of haulage, from the railroad terminals and docks to the warehouses and the stores, from the stores to the different distributing stations, and for special trips with large loads. The working time will average 10 hours daily, and the mileage will range from 40 to 50 miles. A truck that has been used since January, 1909, has been driven more than 40,000 miles and is still in excellent condition.

"EXIDE" DIVIDEND DECLARED.

The Electric Storage Battery Company, Philadelphia, Penn., on July 1 paid, from the net earnings of the company, a quarterly dividend of one per cent. on both preferred and common stock, to stockholders of record of June 20.

The following are recently made agencies for Koehler delivery wagons: Jno. Christensen & Co., Galveston, Tex.; E. S. Curtice, Meridian, Miss.; Whalen Bros., Worcester, Mass.; E. F. Anderson, Summit, N. J.; Regal Sales Company, Youngstown, O.; Frederick Neuhaus, Clinton, N. J.

The Ideal Steel Wheel Company, Cincinnati, O., is to remove its factory to Elkhart, Ind., where with improved facilities the production will be increased and a very aggressive selling campaign will be inaugurated.

WANTS NATIONAL TAX.

A tax ranging from \$5 to \$10, according to the horsepower of the machine, is comprehended by a bill introduced in the House of Representatives at Washington by Congressman Page of North Carolina, which is to apply to the District of Columbia. The purpose is to use the revenue from the tax for road building outside of the fire limits of the city. The tax is to be levied on machines brought into the district for a period of more than five days. As the owners of motor trucks and wagons now have to pay a personal property and a license tax, and, if the machines enter Maryland, a Maryland tax, they are disposed to regard the measure with anything else than favor.

LOCAL CAPITAL IN CONTROL.

Louisville interests have purchased 1200 shares of stock of the Kentucky Wagon Company, Louisville, Ky., owned by W. C. Nones and his son, Seth M. Nones, paying approximately \$50,000 for them, the purchase being made with a view of harmonizing the stockholders. R. V. Board is president of the company and for a considerable period of time the Nones have not been in accord with his policies, this creating a condition that was prejudicial to the progression of the concern.

KELLY-SPRINGFIELD DIVIDENDS.

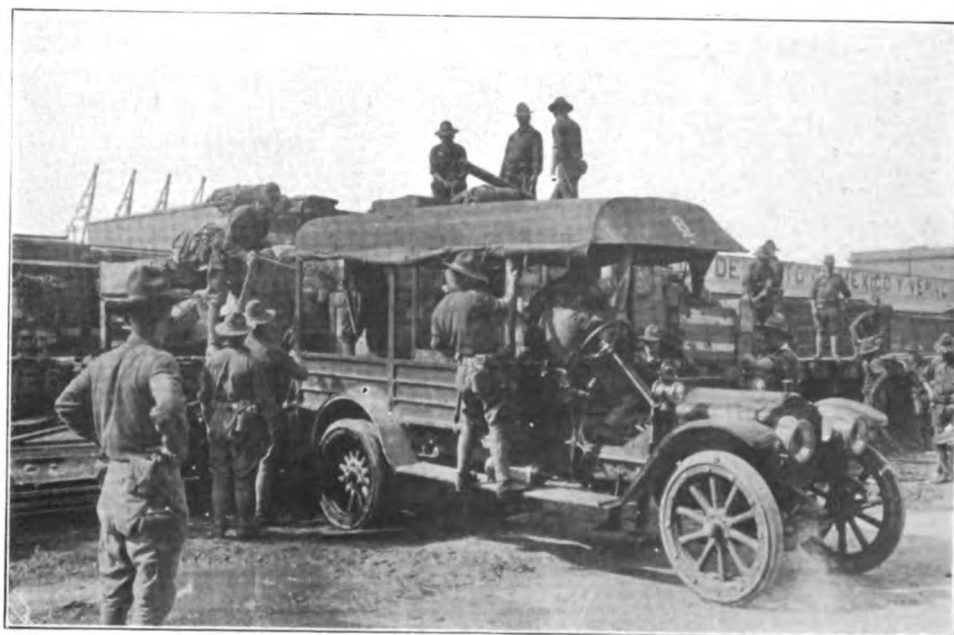
The Kelly-Springfield Tire Company fixed June 15 as the date of payment of the 78½ per cent. cumulative dividends upon the six per cent. cumulative stock outstanding as of record May 6, the payments to be made in second preferred stock, but all dividends requiring an issue of a fractional share were paid the fractional value in cash equal to the par value of any such stock, this obviating the necessity of issuance of partial shares. Holders of the 50-year four per cent. income debenture bonds have deposited more than 90 per cent. of the issue with the Bankers' Trust Company of New York City, this being in accordance with the deposit agreement entered into April 15, and the directors of the company have authorized the trust company to exchange 50-year debenture bonds for six per cent. cumulative preferred stock on a basis of one share of preferred stock of a par value of \$100 for each \$100 face value of bonds.

TRUCKS AT VERA CRUZ.**Modern Methods for Handling Supplies for General Funston's Outposts.**

When the United States army, under General Funston, occupied Vera Cruz, it was intended to make it a base from which operations would be directed toward Mexico City, as it was nearly 70 years before when General Scott advanced from that port on the Mexican capital, but until actual hostilities are begun the occupation is confined to that city and such environments as were necessary to protect it against attack. To preserve the water works was imperative, and this necessitated extending a cordon of guards about Vera Cruz at such a distance as will make a defense practical from a military viewpoint, and supplying the line with whatever supplies and munitions are desirable. The railroad line reaches but one locality, and because of the distribution of the forces, road vehicles were absolutely necessary, for the pack trains were not sufficient and time is a very important factor.

Vera Cruz, like many other Mexican seacoast cities, has miles of poor streets, several well kept thoroughfares, and, beyond the city itself, roads of all description, many of them being cart path and trail. The American lines are continuous and must be maintained in all conditions, and to do this supplies must be carried to them regularly and in sufficient quantity to meet all normal requirement, and provision must also be made for any emergency.

The possibilities with motor trucks were such that several machines were procured, among them being a White 3000-pound machine, and these are kept at work between the outposts and the departmental headquarters in the city, and, whenever possible, other work is accomplished. The mobility of the trucks has



United States Soldiers Loading a White 3000-Pound Wagon Used by General Funston at Vera Cruz for Distributing Supplies to the Outposts.

made practical not only a distinct saving in time, but in expense as well, and in addition there is a reserve that is available at all times. No report has been made of the uses to which the machines were put other than that they have been especially serviceable and have been worked constantly since they have been placed in service, with extreme satisfaction.

FOREIGN TRADE OPPORTUNITIES.

The following opportunities have been reported to the bureau of foreign and domestic commerce of the Department of Commerce, and information regarding them may be obtained by addressing the file numbers at the office of the bureau at Washington, D. C., or the branches in New York, Chicago, New Orleans and San Francisco:

No. 13,320—A South American city purposes to purchase two motor trucks of two tons capacity for use in hauling garbage and waste.

No. 13,281—A South American city is about to motorize its fire department, and the chief of the fire department has informed the American consulate that he would be glad to receive catalogues and detail information of American apparatus, engines, hose wagons, ladder trucks and supplies. The information can be sent direct to the chief or to the consulate for him, and should include prices, discounts and terms.

No. 13,285—A South American consul states that a municipality in his district is advertising for bids for motor street sprinklers that must be equipped with motor driven pumps that will draw sea water from a source six meters below tank, and for trucks for the removal of garbage. There is apparently a market for trucks for haulage of farm products to the ports and conveying supplies returning. Manufacturers may obtain a list of dealers in motor vehicles and supplies in this district.

REMY FOREIGN BRANCHES.

Walter H. Johnson, 60 Haymarket, London, England, has been made the European representative of the Remy Electric Company of Anderson, Ind., and will serve it as manufacturer's agent. He will have headquarters in London, but will establish one or more branches in Continental Europe for the benefit of those who use and deal in Remy productions.

The Kelly-Springfield Tire Company has established its solid tire service department in a new building at 553-55 West 57th street, New York City, which will serve all tire users in the Metropolis and vicinity.

The Boston branch of the Stewart-Warner Speedometer Corporation is now located at 1111 Commonwealth avenue, that city, where it has much larger and more satisfactory facilities and equipment.

TRUCK MAKERS' CONGRESS.

Plans Making for National Convention of the Industry in October.

Plans are now making for a national convention of all manufacturers of motor wagons and trucks, which will take place in all probability in October at some central city—possibly in New York, which will continue for several days and will be of extreme interest to every concern identified with the industry. The organizing of the convention will be by the commercial vehicle department of the National Automobile Chamber of Commerce, and the officials of that body will take a prominent part in the proceedings.

There are many subjects which concern the different manufacturers directly. There is every reason to believe that policies should be determined, but without full exchange of opinions and definite understanding of the purposes to be attained the commercial vehicle department cannot establish them, even were it authorized to do so. The desire is to have the industry as fully represented at the convention as may be possible, to have actual expressions on all matters of importance, and from these deliberations formulate standards and conditions that will be regarded by all.

The commercial vehicle department has been well directed and has been particularly active, but up to the present time it has been handicapped by the lack of policies and the absence of unity in the industry relative to subjects of prime importance. Considering the conditions the division has been singularly productive and a great deal of benefit has been accomplished.

The pleasure car division of the industry may be said to be thoroughly represented by the Automobile Chamber of Commerce, and the policies of the manufacturers having affiliation with the organization have been fully established, but the commercial vehicle interests have not been so harmonized. The enormous possibilities of the industry, the necessity of unity with reference to character and quality of service, the opportunities for concerted promotion and the systematic development of domestic and foreign markets, are subjects that must be met with by the interests collectively, so that each will share in results and each benefit proportionately to the endeavors made.

The convention will be organized on broad lines, every manufacturer will have opportunity for expression, and determinations will be reached after careful consideration of every aspect. A tentative programme will be issued later on. The detail will be arranged after the principal subjects have been decided.

The old Grabowsky Power Wagon Company's plant at 1775 Mount Elliott avenue, Detroit, Mich., has been occupied by the Kramer Governor Company, which was, as the B. G. Kramer Company, located at Milwaukee, Wis.

MOTOR UNDERWRITERS' SERVICE BUREAU.

The Manufacturers and Dealers' Underwriters, Inc., a New York City company, that was organized with the purpose of dealing in insurance, has so changed its plans that the concern will be a service bureau for the benefit of insurance companies and owners of motor driven vehicles throughout the country. The company will place no insurance, and it is expected that the revenue will be largely derived from the insurance companies receiving its service. The organization will include correspondents in all sections of the nation, these being identified with existing motoring or dealers' associations so far as possible.

One of the purposes is to adjust the losses on all cars, regardless of which company carries insurance; another is to have all repairs necessary in connection with insurance protection made by a dealer in the make of machine that is to be repaired; a third is to investigate all applications for motor vehicle insurance; a fourth is to make recommendations on vehicle insurance applications, and a fifth is to conduct a bureau for the recovery of stolen motor vehicles, and to maintain a bureau for drivers, which will have confidential information of the qualifications of every professional driver in the country. Another undertaking will be a campaign against all persons driving recklessly.

INDIANA'S ROAD BUILDING.

A commission of five, which will have the assistance of an advisory board, has been appointed by Governor Ralston of Indiana to make an investigation of the roads of the state, to determine the possibilities for betterment, to make recommendations for improvement and for financing whatever plan shall be believed best, and to decide upon systematic maintenance. This commission will make a report that will be submitted to the next session of the legislature, from which it is expected that such legislation as may be necessary will be formulated.

The advisory board consists of a representative from each congressional district in the state, and each member is expected to submit to the board the needs of each section. With these as a basis a plan of state highway will be developed, together with engineering data and facts relative to locality conditions that may have bearing upon the general scheme. The general purpose of the commission is to determine a policy that will bring about systematic development of the roads.

OIL STREETS BY MOTOR.**Providence Purchases Kinney Municipal Apparatus on Kelly Chassis.**

The city of Providence, R. I., has a peculiar policy with reference to dust suppression, this being to expend public funds for the application of oil to the highway in which trolley lines are operated (if not paved) and to use water in others at the discretion of the department of public works, but if private citizens owning property abutting macadam streets desire oil applied they can make contract with private companies doing this work and pay for the service.

The city derives a franchise tax from the railroads. The cars are driven at sufficient speed to cause dust to rise constantly when the surfaces are dry, and for this reason there is possibly a belief that the city is more obligated to the residents of the streets through which the tracks pass.

For the purpose of oiling the "railroad streets," so-called, and to keep the citizens peaceful, the department of public works has purchased a Kelly truck chassis, on which is installed a Kinney municipal apparatus that may be utilized for watering, oiling or tarring the streets. This carries a 1200-gallon tank with a firebox and kerosene burners at the rear end, this equipment being used to maintain a temperature of the contents of the tank if heavy oil or tar is to be applied. The flames from the firebox are carried through tubes extending longitudinally in the tank and the heat is carried off by a short stack.

The content of the tank is forced through a pair of movable headers attached at the rear a few inches above the surface. The headers may be moved from side to side to vary the application in a path eight feet wide. The distribution is governed by an operator who occupies a seat carried on an arm within reach of the gauges and levers. The pressure pump is oper-



Kelly Chassis Equipped with the Kinney Power-Operated Apparatus for Watering, Oiling and Tarring Highways. Owned by the City of Providence, R. I.

ated by the driver and is driven by a clutch coupled with the main driving shaft. This pump can be used for either emptying or filling the tank. While pumping a bypass set at a predetermined pressure precludes possible damage from obstruction of the pipe system of the shutting off of the outlets by the operator. Means are provided for cleaning and draining the tank when oil or tar is used. This machine is to be used primarily for street oiling, but it will also be utilized for applying tar to all bituminous streets of the city.

CREDITORS FULLY PAID.

In the final report of James I. Gardner, receiver for the Rapid Transit Motor Company, Indianapolis, Ind., is shown the fact that in winding up the affairs of the company the creditors were paid in full and the stockholders received a dividend of two per cent. The company was organized to operate a motor omnibus line in Indianapolis in competition with electric trolley service and discontinued business after a lengthy trial. Mr. Gardner, appointed at the request of the president of the company, disposed of the property and terminated its existence.

NEW FOUNDRY COMPANY FORMED.

With C. B. Wilson as president, D. R. Wilson as vice president and C. E. Killenger as secretary and treasurer, the Wilson Foundry & Machine Company has been organized at Pontiac, Mich., to conduct a general foundry business, specializing in gasoline motor cylinders. The plant has been located in a part of the building that was occupied by the Flanders Manufacturing Company.

PEERLESS DIVIDEND DEFERRED.

The Peerless Motor Car Company, Cleveland, O., has deferred the usual dividend on the seven per cent. cumulative preferred stock of the company because of the desire to conserve its resources, in anticipation of placing a new type pleasure car in the market that will be sold at a popular price.

The Buckeye Engine Company, which manufactures gasoline motors, is to build a plant at South Lima, O., which will have a main building of brick.

Superintendent Robert Wilde of the gear department of the Warner Gear Company, Muncie, Ind., has resigned to enter business in that city as a consulting engineer, specializing on gear design and work.

Col. George Pope of the Pope Manufacturing Company has been re-elected president of the National Association of Manufacturers by the board of directors of that organization.

WANT LOWER FERRY RATES.

New York Business Men Demand Reduction of Tariff for Motor Trucks.

Dock Commissioner Smith of New York City gave a hearing July 7 to representatives of the Merchants' Association, the National Automobile Chamber of Commerce, the Motor Truck Club of America, different civic and commercial bodies, and to representatives of the Trunk Line Association and the various ferry companies that operate between Manhattan island and New Jersey, Staten and Long islands. The purpose of the hearing was to determine the justice of the claims made by the manufacturers and users of motor trucks and wagons that the rates charged for ferriage were unreasonable and discriminatory.

W. H. Chandler, assistant manager of the traffic bureau of the Merchants' Association, presented a very carefully prepared statement, which made comparison of the rates charged for different types of motor and animal vehicles by the municipal and railroad ferries, and demonstrated that, as charges are assumedly based on the deck space occupied quite as much as the weight, the tariff of each ferry was excessive so far as it related to power wagons and trucks.

Tariff Manager J. K. Marvin of the National Automobile Chamber of Commerce was in accord with the views of Mr. Chandler. President George H. Duck of the Motor Truck Club, presented a memorandum which supported his statements that the rates were discriminatory, and this stated the following nine reasons on which the claims were founded:

1. Motor wagons and trucks occupy less space than horse-drawn vehicles, permitting a greater number on the boats and therefore a larger amount of revenue;
2. Motor truck tires are wider than those of horse vehicles, thus distributing the weight more evenly on deck timbers;
3. Motor vehicle tires are universally of rubber, thus causing less wear and tear upon deck timbers;
4. When on the boat, motor trucks are absolutely stationary, whereas horses are constantly in more or less motion, stamping upon the deck timbers with their creaking hoofs, causing unnecessary wear;
5. Motor trucks while on the ferries have their brakes locked and there is no liability of accident due to sudden stopping or starting of the boat, as is the case with horses;
6. Motor trucks move more rapidly in stopping and starting and the loading and unloading of the ferry boats is therefore subject to less delay from this standpoint;
7. Motor trucks are never inconvenienced by any incline of the approach to or from the ferry boat, due to the falling of the tide, and therefore eliminating the necessity of a power windlass which has been necessary to aid the horse vehicles;
8. The deterioration of floor timbers from chemical action resulting from the presence of horses is absolutely eliminated with motor driven vehicles;
9. The presence of motor trucks upon the ferries eliminates the necessity of any one man or number of men, whose duty it is to clean up the refuse which the presence of horses requires.

The hearing was adjourned with the understanding that another session would be held after the representatives of the ferry companies had had opportunity to consult, and that there was probability of a joint committee being appointed to confer with Dock Commissioner Smith, Superintendent of Ferries Hanlon, and officials of the trunk line railroads operating the North river ferries, which will determine a basis for uniform charges and make reductions that will be satisfactory to the interests making protest.

CUBAN CUSTOMS TARIFF.

A document known as Tariff Series No. 27B, a supplement to Tariff Series No. 27, published in 1911, which deals with the customs tariff of Cuba, has just been issued by the bureau of foreign and domestic commerce of the Department of Commerce. This contains all the changes in the Cuban tariff since the issue of the principal publication in 1911, including those covered by Tariff Series No. 27A, now out of print. Copies may be obtained by application to the department, but copies of Tariff Series No. 27 are for sale by the superintendent of documents, government printing office, Washington, D. C.

MAMMOTH GARAGE PROJECTED.

Plans have been made for a garage which, when completed, will be one of the largest in the world, and will afford service to both pleasure and freight vehicles, to be located in East 73rd street, New York City, near Lexington avenue. The garage will be designed and equipped to obtain the greatest degree of economy. Frederick Brooks, who is largely interested in the proposition, is now abroad studying garages in some of the principal European cities. He will incorporate his ideas in the new building and its equipment.

WILL BUILD MEUHL DIFFERENTIAL.

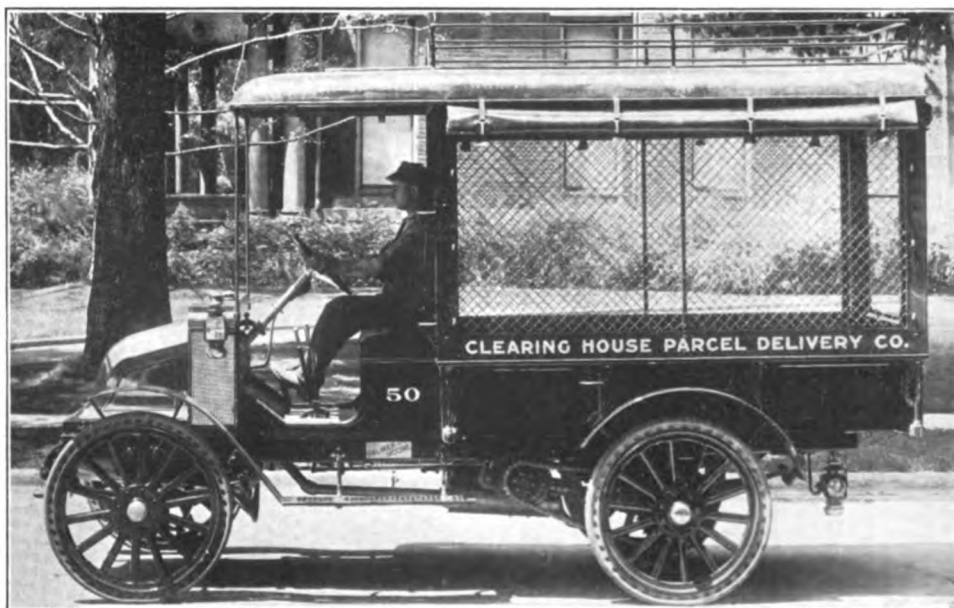
The American right to manufacture the M & S spiral gear differential, which was owned by the M & S Gear Company, Kansas City, Mo., has been purchased by the Brown-Lipe-Chapin Company, Syracuse, N. Y., and the differential will be produced commercially to meet any demand. The differential was invented by William Meuhl. Power is transmitted from the master or main gear to the axle shafts by spiral pinions housed in a cage attached to the main gear. The axes of the spiral pinions constitute arcs of the circumference of rotation of the cage or housing, and they engage corresponding gears on the shafts. One claim for the construction is the equalization of the power, that the wheel that has the greatest traction has the greatest power exerted upon it, and another is that where one wheel had small traction and the other good traction, sufficient power can be obtained with one wheel to move the vehicle. Skidding is said to be minimized.

TRUCK GARAGE METHODS.**Ideal and Actual Conditions Debated by Motor Truck Club Members.**

"Garaging and Care of Motor Trucks" was the general subject considered by the members of the Motor Truck Club of America at the meeting held at the house of the Automobile Club of America, New York City, and though several of the persons expected to speak were not present, the exchange of opinion and experience was of material benefit to all present. From the viewpoints of the manufacturer and the owner a great deal depends upon the care and attention given machines, and the purpose of the meeting was to stimulate the interest of the owners and to impress upon them the necessity of having practical and dependable organizations and systems that they might realize the fullest utility of machines at the least necessary expenditure.

Because of a misunderstanding as to the date Fire Commissioner Robert Adamson, who was to read a paper on "Fire Prevention and Protection in Motor Truck Garages", was not in attendance, but the members are assured of the presentation of the subject at a future meeting. Harold Martin, engineer for the H. C. & A. I. Piercy Contracting Company, in a paper on "An Ideal Electric Truck Garage", in detail described what he regarded as a garage that could be used with extreme efficiency, and which would be productive of operating economy, the arrangement being with a view of saving labor and utilizing floor space.

A condition that appeared to be very general was impressed upon the meeting by H. J. Benjamin, a truck garage manager, who stated that his observation was that owners of trucks seldom visit the garages where their machines are stored, that they have



One of the Fleet of 20 Palmer-Moore 1600-Pound Delivery Wagons Bought by the Clearing House Parcel Delivery Company of Boston, Mass.

little or no information relative to the care and attention given them, and they manifested but little concern as compared with the owners of animals, who realize the necessity of their property being well cared for to be even reasonably efficient and productive.

Chief Engineer G. A. Green, with the Fifth Avenue Coach Company, read a paper on "A Modern Truck Garage", in which he described the large service station of his company and related the requirements as demonstrated by the experience of the company. A. F. Masury, manager of service for the International Motor Company, presented a paper on "What Constitutes Proper Garage Equipment for the Care of Gasoline Motor Trucks", and David C. Fenner, district manager for the New York district for the General Vehicle Company, speaking extemporaneously, described a series of forms he created for the purpose of determining the cost of repairs and overhauling work on motor trucks. Joseph Husson of the Commercial Vehicle Company, showed a series of lantern slides that illustrated actual conditions at several garages, and from these the conclusion was drawn that converted stables were not desirable when garage economy is sought, and as a rule the best results are only obtainable in buildings erected especially for garage purposes.

The purpose of Commissioner Featherstone of the street cleaning department of the city to use motor vehicles in one cleaning district of the city, to determine the relative economy of work so done, was brought to the attention of the club. The members heartily approved the project and as a whole stated a willingness to co-operate with the commissioner and his department to insure the city obtaining the fullest utility of the machines with which the experiment shall be made.

NEW TIRE FACTORY PLANNED.

A factory that will have considerable capacity and will have fine machine equipment is to be erected at Springfield, Ill., for the Detroit Pneumatic Tire Company, which was recently organized at Detroit. The purpose of the company is to turn out a complete line of motor vehicle shoes.

Announcement is made of the retirement of T. W. Warner, president and general manager of the Warner Manufacturing Company, Toledo, O., and head of the T. W. Warner Company, Muncie, Ind., from his association with the Muncie Gear Works, Muncie, Ind.

G. Norman Baughman has been placed in charge of the service station established by the Stewart-Warner Speedometer Corporation at 610 Tampa street, Tampa, Fla.

The Vacuum Oil Company, Rochester, N. Y., has issued a booklet entitled "Lubrication of the Automobile" that is unusually complete and comprehensive.

MOTOR VEHICLE BUILDERS IN DETROIT.

A census taken of the employees of 24 different establishments in Detroit, Mich., June 1, showed a total of 42,883 men then at work, and that was with the production departments generally the smallest of the year. The expectation is that by Sept. 15 the same factories will employ nearly if not quite 60,000. Of the total working when the census was taken about 800 were employed by the plants producing electric machines and about 500 by those building wagons and trucks exclusively, although a number of the concerns construct both passenger and freight motor vehicles.

OHIO ROAD BUILDING.

The Ohio highway commission will, on Aug. 4, award contracts for road construction in that state that will aggregate \$2,000,000 and provide for the improvement of highways in 38 counties. Contracts totalling \$225,000 for improvement of roads were awarded July 7. The work to be done in Ohio this year will be the largest the state has ever undertaken, and when this is completed material progress will be made in the general scheme of state highway construction.

ERBES DELIVERY WAGONS.

Light motor delivery wagons will be built by L. C. Erbes, who recently acquired the factory of the Dilver Manufacturing Company, 2654 University avenue, St. Paul, Minn., who is equipping the plant and obtaining material to be used. If the plans are realized about 250 machines will be built the first year. Construction will be begun about October unless conditions eventuate that will necessitate delay.

To become chief engineer of the Titan Storage Battery Company, Newark, N. J., W. Crighton Harris has retired from the firm of Crighton, Harris & Co., engineers.

The Universal Motor Truck Company, Detroit, Mich., has engaged Clarence N. Booth, formerly general manager of the Studebaker Corporation, as special advisor of the management with reference to production and selling.

L. W. Logan, formerly located with the company at Indianapolis and Chicago, has been placed in charge of the office established at 911 Dime Bank building, Detroit, Mich., by the Link-Belt Company of Chicago, Ill.

The Helvetia Milk Company, Lamar, Col., has established a motor truck service for the collection of milk from farms in the section surrounding that town, this being the result of inability to secure transportation of milk by railroad trains.

POWER AND PERFORMANCE OF GASOLINE TRUCKS.

POWER rating of motor wagons and trucks has generally been by the estimated engine capacity, based upon a theoretical maximum efficiency. This maximum has been accepted first because it was approved by the Association of Licensed Automobile Manufacturers, and later was continued by the Society of Automobile Engineers. Engineers have recognized the necessity of more definite methods of establishing vehicle capacity, but formulae devised have not been adopted as standard. In fact, in America there has been apparently no disposition to consider this subject as carefully as its importance deserves.

At the mid-summer meeting of the Society of Automobile Engineers at Cape May the matter of accurately determining the power of machines was presented in a paper by Cornelius T. Myers, which was a statement of the results of a series of tests according to a formula suggested by Mr. Myers, and the conclusions were of such a character as to justify the serious consideration of the organization. Mr. Myers' paper was especially interesting from an engineering point of view. It was as follows:

Eighteen months ago the writer presented to the society a paper entitled "Motor Capacity for Motor Trucks", in which was given a formula for comparing the motor capacity (based on the A. L. A. M. rating) of the various motor trucks on the market. This formula was based on the characteristics of the truck—weight, motor dimensions and efficiency, gear reduction, efficiency of the transmission system, and driving wheel diameter. No attempt was made to go into the derivation of the formula, the object of the paper being to centre attention on what seemed to the writer an unwarranted tendency on the part of designers of gasoline motor trucks to burden them with motors of too great capacity. Certain assumptions were made from the meager data then at hand, and comparisons were made with existing practise in motor truck design both in this country and abroad.

Shortly after the presentation of the paper mentioned, I was engaged on some work which put into practise the ideas referred to in the paper. A truck was designed and built and a number of tests made with it. The results tallied so closely with previous assumptions that I am led to believe that those assumptions are nearly correct for the average conditions under which such trucks operate in this country. The results are therefore placed before you for discussion, and the derivation of the formula will be given so that there will be no chance for misunderstanding as to its scope or limitations.

To recall the gist of the previous paper, calculations were made to reduce motor dimensions, gear reductions, etc., to the force available at the driving wheels, the tractive effort which the motor and transmission system of the particular truck were capable of exerting. This force, expressed in pounds, was divided by the total weight in pounds on the tires (consisting of the chassis, body and load), and the result was the "Tractive Factor" of the truck, expressed in pounds of tractive effort per pound of total weight. This term designates the ability of the truck to overcome certain resistances to propulsion, and must at least be equal to a "Resistance Factor", composed of the road coefficient, plus an assumed grade which must be climbed in high gear, plus any other resistance to propulsion—such as air resistance or the load imposed by a trailer. The road coefficients were calculated from figures given by Mr. Churchward on page 22, volume one, S. A. E. handbook, for resistance to rolling in pounds per ton on solid tires. These figures divided by 2000 become the road coefficients, and if we add the assumed grade (expressed in per cent, divided by 100) we have the resistance factor for any particular type of road on such a grade expressed in the same terms as the tractive factor. The two can then be equated for the purpose of checking or determining the motor capacity.

Horsepower Determinations.

The formula was derived as follows:

Given the bore and stroke of a motor we can get the A. L. A. M. horsepower and determine the torque on the propeller shaft.

$$\text{Torque of motor in lbs. at } 1'' \text{ radius} = \frac{33,000 \times \text{HP} \times 12}{2\pi \times \text{RPM}} \quad (1)$$

As the A. L. A. M. formula is based on the output at a piston speed of 1000 feet per minute, and s being the stroke of the motor in inches,

$$\text{RPM} = \frac{1000 \times 12}{2s} \quad (2)$$

$$\text{A. L. A. M. HP} = \frac{b^2 n}{2.5} \quad (3)$$

Substituting (2) and (3) in (1) we have

$$\text{torque} = t = \frac{33nb^2s}{2.5\pi} = 4.2nb^2s \quad (4)$$

This motor torque can be reduced to tractive effort E at the periphery of the driving tires as follows:

$$E = \frac{t \times \text{gear reduction (R)}}{\frac{1}{2} \text{ dia. of driving tires}} = \frac{2tR}{D} \quad (5)$$

Substituting for t we have

$$E = \frac{8.4nb^2sR}{D} \text{ in pounds.} \quad (6)$$

Now the tractive factor TF , referred to above, is the tractive effort in pounds divided by the total weight in pounds, on the tires; equals $\frac{E}{W}$, whence,

$$TF = \frac{8.4nb^2sR}{D \times W} \quad (7)$$

All of the above is on the assumption that the motor develops at any speed a torque equivalent to its A. L. A. M. horsepower rating at that speed, and that the efficiency factor of the transmission system is unity; so that for practical use, other than a comparison of the relative motor capacity of a number of trucks, it is necessary to multiply the result by em (the factor representing the actual motor torque with reference to the torque based on the A. L. A. M. rating), and by et (the factor representing the efficiency of the transmission system); em varying between .90 and 1.4 and et varying between .70 and .85. Then (7) becomes

$$TF = \frac{8.4nb^2sR}{D \times W} \times em \times et = "RF" \quad (8)$$

And

$$nb^2s = \frac{8.4R \text{Remet}}{"RF" \times D \times W} \quad (9)$$

In the previous paper em was taken as 1.2, and et as 0.70. Using these factors in connection with four-cylinder motors reduced (8) to

$$"TF" = \frac{28.22b^2sR}{D \times W} \quad (10)$$

Several have taken the stand that $em = 1.2$ is too high and that at present the average truck motor cannot be relied upon to perform at such a rate. In the light of some experiments made during the past year, $em = 1.1$ might be taken as a more reasonable specification for the time being. On the other hand, et , even for chain driven trucks which are not new, it is believed will be close to 0.80 in well designed chassis, and in some cases exceed this figure; however, 0.76 is quite conservative, and using these revised figures in connection with four-cylinder motors (8) becomes

$$"TF" = \frac{28.2b^2sR}{D \times W} = "RF" \quad (11)$$

and

$$b^2s = \frac{28.2R}{"RF" \times D \times W} \quad (12)$$

"TF" need not be greater than the resistance factor, "RF", expressed in pounds of drawbar pull per pound of total weight on the tires.

It may not be amiss here to repeat the road coefficients expressed in terms for use in these equations.

Hard, level asphalt.....	0.0100
Wood pavement	0.0115
Level macadam	0.0115—0.0300
Plank road	0.0090
Cobble stones	0.0175
Good dirt road.....	0.0110—0.0200
Ordinary country road (dirt).....	0.0200
Sand	0.2000

Variable Factors.

The above figures are subject to some modification due to the variation in tire compounds, diameters, etc. The writer believes that under average conditions 0.0175 represents fairly well the coefficient of macadam and good dirt roads and the poorer stretches of city pavements. A truck, fully loaded, should be able to climb a three per cent. grade over such roads in gear, but much more than this is inadvisable because it burdens the truck with a power plant and transmission out of proportion to the requirements for 80 to 90 per cent. of its work, except in cases of special service over normally bad roads and heavy grades. The sum of these two items, 0.0475, is the resistance factor, "RF". Where the body on the truck chassis is very large and the speed of the truck is comparatively high, an additional allowance must be made for wind resistance; but

I believe that a "TF" greater than 0.0475 is hardly necessary for well designed trucks of one to seven-ton load capacity.

Method of Making the Test.

The truck referred to in the second paragraph of this paper was designed to carry a pay load of 5000 pounds. The estimated weight of the chassis, body and load, was 10,000 pounds; the motor size was $3\frac{3}{4} \times 5\frac{1}{4}$ " (four cylinders); the gear reduction on "high", 8.05 to 1; the diameter of the tires on the driving wheels, 36". Applying these figures in (11) we have

$$\text{"TF"} = \frac{28.2 \times 3\frac{3}{4} \times 3\frac{3}{4} \times 5\frac{1}{4} \times 8.05}{36 \times 10,000} = .0475$$

The truck was of conventional chain drive type, built from parts largely purchased in the open market, but the general design was first carefully worked out, and every detail studied from four aspects—reliability, accessibility, efficiency and cost. The first two items were considered of prime importance, the third essential, and the last only when the first three were satisfied, although low cost was kept constantly in mind. Two general plans were made and discarded in favor of a third which seemed to be capable of fulfilling expectation on all four points. The mountings of the parts were planned with care that they should be simple as well as substantial; in fact, simplicity was the keynote of the chassis.

While the truck was built in accordance with some very definite theories, it was not built merely to demonstrate those theories, for the writer felt that previous experience fully warranted the lines followed. It was built as the first of a series to be placed on the market; and the trials were made in order to amply satisfy those interested that it would perform in accordance with certain standards and could be built within the range of a certain schedule of costs. The chassis was not a special one built to fit a theory instead of being laid down as a commercial proposition. It was put through a 1500-mile test in which it performed up to expectations. Some of the results of this test bear directly on the formulas given above.

Truck Weight and Load.

The truck weighed 4800 pounds, including body, oil, water, gasoline, tool kit and a few spare parts. The pay load carried throughout the greater part of the 1500 miles was 5600 pounds, which brought the weight on the tires up to 10,400 pounds. No attempt was made before starting to tune up the motor or other parts to their very best. These were assembled after an inspection and very few adjustments were made. A few accelerometer readings were taken to check the carburetor adjustment, and to ascertain in a general way whether the motor was developing its A. L. A. M. rated horsepower. As approximately rated horsepower was indicated, nothing further was done; after a preliminary run of 50 miles under load the truck was started across country.

The first run of 340.1 miles from Detroit to Pittsburg was made in three and one-half days. On this run one rear wheel twice went into the ditch; and in Cleveland one rear wheel went through a garage wooden floor. On all three occasions the truck pulled out under its own power without other assistance, in spite of extreme frame distortion. In Cleveland all the load was removed and a block-and-tackle rigged from a beam overhead hooked to the felloe of the wheel that had sunk through the floor. As the truck moved forward under the power delivered through the other wheel, the depressed wheel was raised. On the other two occasions only half the load was removed. Although on each occasion the frame was very badly distorted, none of the working parts was cramped, practically the full power of the motor being available as tractive effort under the emergency conditions. Unless a motor truck is so designed that this can be accomplished, a larger "TF" must be assumed and a proportionately larger motor installed.

Fuel and Oil Consumption.

The total amount of gasoline consumed on the first trip was 34.75 gallons—equivalent to 9.79 miles per gallon. The specifications called for a performance of a 9 mi. gal. on hard, level roads. The economy obtained was very satisfactory considering the many miles covered in low and intermediate gears. The amount of fuel given includes that used in starting up, doing a little cleaning and waste of all kinds. Runs of 20 to 30 miles in and around Pittsburg showed fuel economies well above 10 mi./gal.; equivalent to more than 25 pay ton-miles per gallon. The gross ton-miles per gallon in some instances exceeded 60.

Different makes of carburetor were carefully tested for comparison. While there was a very appreciable variation in the economy the differences (for the most part) were not as great as expected. The acceleration readings, however, with the various carburetors, differed considerably—some being nearly double others.

The oil used in the motor amounted to 1.5 gallons; equivalent to 266.7 mi./gal. The specifications called for 250 mi./gal. The performance was fair, but not up to expectation. It was considerably bettered, however, in later runs when more care was taken to prevent losses.

Factors in the Record.

Much time was spent in taking accelerometer readings, measuring grades and getting fuel consumptions under varying conditions. A specially calibrated speedometer with a 30-mile scale, instead of the usual 60-mile scale, made possible accurate checking of the speed of the truck; and two odometers checked the mileage. Some of the data collected afford interesting light on the formula for "TF". Calculating this for 10,400 pounds we get

$$\text{"TF"} = \frac{28.2 \times 3\frac{3}{4} \times 3\frac{3}{4} \times 5\frac{1}{4} \times 8.05}{36 \times 10,400} = .0457$$

Subtract the road coefficient of .01 for new smooth brick pavement and we have .0357, which indicates that the truck will

climb a 3.57 per cent. grade on high gear on this pavement. As a matter of fact it repeatedly climbed grades of 4 to 4½ per cent., indicating that either em was greater than 1.1 or that it exceeded 76 per cent. Accelerometer readings gave a coasting resistance of 35 pounds per ton, which is equivalent to a resistance factor of .0175; and the average acceleration reading at 12 mph was 1.325 ft./sec./sec., which is equivalent to .0415. As .0175 was allowed for the road coefficient alone (in the paragraph following the tabulation of the various road coefficients), it follows from these readings also that em and et are greater than have been allowed for in (11).

Observations and Conclusions.

Assuming em = 1.1, et = 100 per cent., and a driving wheel diameter of 34"—the last because the distance from the centre line of the axle to the ground was actually about 17", due to the flattening of the tires under the effect of the load carried—we get "TF" = .0622. Adding to the acceleration reading .0412 the road coefficient .010 and dividing the sum by

$$\text{"TF"}, \text{ we get } \frac{.0412 + .010}{.0622} = 82.3 \text{ per cent. for the efficiency}$$

of the transmission system under full motor torque, on high gear, at 12 miles per hour. Calculating, by means of the accelerometer readings, the horsepower being delivered by the motor, we have

$$\frac{(.0412 + .0175 \times 10,400 = 529 \text{ pounds tractive effort, and } 529 \times 17.6}{550 \times .83} = 20.5 \text{ horsepower,}$$

which tallies closely with the rated horsepower at 955 rpm, plus the 10 per cent. given by the factor em = 1.1. Thus

$$\frac{3\frac{3}{4} \times 3\frac{3}{4} \times 4 \times 955}{2.5 \times 1140} \times 1.1 = 20.6 \text{ HP.}$$

Comparing the accelerometer reading .0175 with the "TF" .0622, we find that the motor under normal road conditions is running at about 28 per cent. of its full capacity, and has a reserve of 2½ times the normal running power. While this proportion of power rating is not great enough to give the maximum gasoline mileage, it does very well for average conditions and leaves an ample margin of power for poor roads and moderate grades without the necessity of having to change gears. The "TF" for low gear figures

$$.0622 \times 3.65 \times .90 = .205$$

and deducting .0175 for the road coefficient we get a remainder of .1875 available for grade climbing on a country road—the equivalent of an 18¾ per cent. grade. The maximum measured grade encountered on the above-mentioned trip was 19.4 per cent., the road surface being of small, round stones on a clay bed. The truck climbed it without hesitating.

A long series of carburetor tests, made subsequently, brought out further points of an interesting nature, but the writer has not analyzed the results thoroughly with respect to the subject at hand. As a check on carburetor design and adjustment I believe that the accelerometer, properly used, will yield a great deal of information. I have little faith in the results of block tests, for they do not impose operating conditions upon the apparatus tested. The criterion by which the product of our shops is judged is its performance on the road, and until we take pains to investigate this performance we are likely to go considerably astray.

As mentioned in the previous paper, the "TF" formula affords a ready means of comparing the "power" of gasoline motor vehicles. This is a subject which has suffered much in the hands of many associated with the motor industry, and possibly the formula will be the medium of dispelling some rather dubious arguments as to the value of large motors in gasoline motor vehicles of any kind. The formula as indicated in (8) is comprehensive, and unless every factor embraced in it is considered, there can be no just comparison of one chassis with another so far as its power plant is concerned. As shown in (10) it affords a ready gauge for the average truck at present.

For pleasure cars the constants must be modified for use in designing, and an additional coefficient for wind resistance added to the resistance factor "RF".

WILLYS-OVERLAND PROFITS.

The earnings of the Willys-Overland Company for the fiscal year ending June 30, will, it is believed, approximate 30 per cent. on its capital stock, and this after a reasonable allowance for depreciation, etc. The earnings of the company for the previous year aggregated approximately 26½ per cent. on its common stock, and there was a liberal distribution to the stockholders in addition to the regular dividends.

Six Moreland two and a half-ton trucks are in service for the Imperial Valley Transportation Company, San Diego, Cal., and are operated for public haulage between that city and Imperial.

THE ELECTRIC TRUCK VS. THE HORSE.

High Relative Efficiency of the Machine Demonstrated by Careful Comparison of Operating Costs for Periods of More Than Two Years with Large Services.

CHARLES A. Ward of the Ward Motor Vehicle Company, New York City, whose company has been actively identified with the electric motor vehicle industry since 1901, and whose experience has been with some of the largest electric vehicle transportation services in America, was the principal speaker at the initial meeting of the Pittsburg, Penn., section of the Electric Vehicle Association of America, held in that city June 11. Mr. Ward's subject was "The Electric Commercial Vehicle vs. the Horse", and in the course of his address he presented some extremely illuminating tabulations.

The chief value of the figures was in the fact that they were exact statements of expense, extending over considerable periods, and were not in any sense theory. In two instances comparisons were made of electric vehicle and animal delivery for not less than two years, and in five others precise tabulations were given of the cost of horse equipment.

Another very interesting presentation was that which showed the cost of horse and electric vehicles from zero to 34 miles a day, and the relative expense of maintenance of the two forms of transportation when idle and for four different distances. These figures were theoretical, but based on the information obtained from actual service charges, which are in large measure dependable, but which might be expected to vary somewhat according to the locality and the conditions of operation.

Mr. Ward's paper was as follows:

There are doubtless none of you who have not at one time or another been visited by that pest or God send, as the case may be—the electric vehicle salesman, and of whom you have asked after much talk—to you, that final and all important question—"Why an electric?"

You have been told in reply that electricies are durable, reliable and economical. True! electricies are durable; no one will dispute the fact for scores of electricies still run in regular service that were installed more than 10 years ago, while many, many more could be run were it not for the fact that the more efficient machines of later years make it more profitable to lay aside the earlier type because of the greatly increased earning capacity of the present vehicle. Certainly then you believe them durable and let me add this one word for those whose belief still borders on that of skepticism, that an electric will last as long as the owner will provide it with necessary running repairs.

But you say, and rightly so, are electricies reliable?

Before going further, what is reliability? Reliability, we are told, is that element in any piece of apparatus that makes it possible to depend upon that apparatus for the performing of its various functions a high percentage of the time at which such demands are actually made of it.

Is the electric reliable? Almost without exception owners of electricies will tell you that they are, and the writer has personal knowledge of a reliability factor as high as 98½ per cent. in a very large installation and during the winter period of the year. There are many, many cases of electricies in commercial service that have operated for months at a time with nothing more than a charge, an occasional oiling and some adjustments. The best answer to such a question is always found with those firms whose very prosperity and life depend upon the regular and prompt delivery of their merchandise, and the express companies, baking companies and department stores are only some of the more important examples.

The Economy of the Electric.

You have been assured then of the durability and the re-

liability of the electric. But how about their economy? For you say, and justly so, that even though electricies are both durable and reliable, I cannot afford to buy, much less use them, unless they will enable me to reduce my delivery expense. And let me emphasize for you this last factor by making this broad and comprehensive statement; namely, that you not only cannot afford to use electricies unless they will reduce your delivery expense, but you have no right or business to use them unless that use means a real economy to you and something that can be measured in dollars and cents.

Let us see then whether or not this last acid test can be given with safety to the electric vehicle and whether it will withstand this test under every condition of use, for if it does, you will be obliged to reach this conclusion; namely, that the best time to sell your horses is now while the market is good, and the best time to buy electricies is now so that you may the sooner reap the saving in delivery expense that is in store for you.

Before passing to the next division of the paper, let me say that the value of the electric vehicle from an advertising standpoint will not be considered as an asset, although there is undoubtedly a very good advantage in their use in this respect in such lines of business as those of caterers, bakers, butchers, and in fact any business involving the handling or haulage of foodstuffs.

In the cost comparisons which I hope to show later, let me say that in the cases of both the electric vehicle and the horse wagon every item of expense has been considered except operator's wages. This has been omitted for the reason that in each case here analyzed this item has been considered as a selling and not a delivery expense.

Operating Cost of Electricies.

First then, what does it cost to operate electric vehicles? Let me answer this question by showing you in table No. 1 the complete costs of two large fleets of electricies; the average of which has been taken over a period of more than two years and where, as I said before, every item of expense has been considered except operator's wages.

To get quickly to the root of the matter, you will note under plant "A" that the cost a route a year is \$913.60, while in plant "B" the cost is \$952.21. An average of these two figures shows \$932.95 as the cost a route a year covering the electricies in question.

Let me now show you table No. 2 whereon is shown the operating costs for horse vehicle routes in a similar line of business and in cities extending from New England to the Middle West.

Comparative Cost Statement Between Electric Motor Wagons at Plants "A" and "B".

	Plant "A"	Plant "B"
Labor	\$21,776.51	\$20,710.32
Batteries and supplies.....	8,734.81	8,369.23
Repairs	14,428.08	19,884.62
Insurance	7,650.00	8,222.16
Taxes	272.53	322.53
Six per cent. interest on investment..	14,008.20	14,587.77
Depreciation (buildings one per cent.), automobiles	18,664.29	18,680.53
Power (estimated), 1½¢ per K. W. H. ..	6,739.20	7,300.80
Total.....	\$92,273.62	\$98,077.96
Average number autos.....	121	130
Average number routes.....	101	103
Average number autos per route....	1198	1262
Average cost per route per year....	\$913.60	\$952.21
Investment, land	16,736.44	17,209.54
Investment, buildings	34,017.17	37,287.17
Investment, automobiles	182,716.47	188,632.75
Total.....	\$233,470.08	\$243,129.46
Average investment per route per year	\$2,310.59	\$2,360.48

The period covered by the above report was over two years.

If you will note again the cost per route a year you will find these figures varying all the way from \$1060.80 to \$1337.65 a route a year for the horse vehicle equipment. If again we average the five sets of figures in question here we will obtain \$1210.45 as the cost a route a year covering horse vehicle operation, or an average saving of \$277.30 in favor of electricies.

If for the moment we return to plant "A", table No. 1, where they operate 101 electric routes, this means an actual annual saving of 101 times \$277.30, or \$28,007.30 in delivery expense, to say nothing of a cleaner delivery method.

There must be something wrong you say; such figures are amazing, they cannot be right. Let us see:

Comparative Cost Statement Between Horses at Plants "C", "D", "E", "F" and "G".					
	Plant "C"	Plant "D"	Plant "E"	Plant "F"	Plant "G"
Horse expense	\$2,668.38	\$3,608.57	\$4,106.60	\$3,984.91	\$6,912.88
Wagon	2,172.07	3,861.56	5,473.40	501.26	7,287.27
Harness	542.54	720.91	1,504.70	470.20	952.98
Stable labor	4,168.63	8,443.94	5,916.26	5,892.42	9,783.05
Feed	8,462.45	13,127.41	15,606.33	13,577.72	17,137.78
Stable sundries	1,049.45	1,873.81	1,889.78	1,176.13	2,444.29
Depreciation (10 per cent. on wagons and harness), (1 per cent. on land and buildings) ..	919.98	1,462.38	1,396.90	1,557.97	1,405.22
Taxes	717.96	868.99	1,512.98	1,613.26	711.00
Insurance	102.26	117.08	120.27	237.07	470.00
Six per cent. interest on investment	2,772.71	3,926.24	3,661.71	5,768.02	1,692.15
Total expenses	\$23,576.77	\$38,010.89	\$41,188.93	\$34,778.96	\$48,796.62
Average number wagons	28	32	44	25	75
Average number horses	47	80	64	63	96
Average number horse wagon routes	20	32	32	26	46
Average number horses per route	2.35	2.5	2.0	2.423	2.087
Average cost per route per year	1,178.83	1,187.84	1,287.15	1,337.65	1,060.80
Average investment per route per year	2,310.60	2,044.92	1,907.14	3,697.45	613.10
Investment, horses, wagons and harness	25,560.89	24,014.31	17,628.86	21,157.99	27,350.68
Land and buildings (estimated)	20,651.01	41,423.07	43,409.58	74,975.66	851.82
Total investment	\$46,211.90	\$65,437.38	\$61,038.44	\$96,133.65	\$28,202.50
The period covered by the above report was over two years.					

In the first place let me state that the average mileage for the electrics given in table No. 1 is practically 25 miles a day for each route, while the average length of the horse route in table No. 2 is just about the same.

Secondly, you will note that the average number of horses per route varies from two in plant "E" to 2.5 in plant "D".

A lot of useless spares you will say, eating their heads off and not doing any work. No they are not, for it takes two horses to every single-horse wagon, the average daily mileage of which is 25 miles; and more than this where the routes are hilly or the roads bad. Expert horsemen will tell you, and tests I have made have shown, that a single horse in a single-horse wagon cannot average more than 17 miles a day without undue depreciation, either physically or commercially. Two horses in a single-horse wagon can average daily not more than 25 miles under similar conditions.

But you say, "my routes are short. I only average a little more than one horse to a single-horse wagon and my horses are in the pink of condition. Electrics would be of no value to me. I could not make them pay".

Just here let me make this very important statement and one which I will attempt later to prove; namely, that "a single electric against a single-horse wagon can do the same work for less money regardless of the mileage".

Cost of Idle Equipment.

I have shown you beyond contradiction, I believe, that the electric had the horse beaten on routes averaging 25 miles or more. Did you ever stop to think what horse expense stopped when the horse did no work but merely stood in the stable? He eats almost as much when idle as when working. He requires nearly as much care. Interest, depreciation, taxes, insurance, shoe and veterinary bills go on just the same. In fact it costs you very nearly as much whether he works or not. Think now what happens when an electric stands idle. Repairs to mechanism disappear at once. No care is needed, no current is necessary for charging and only slight depreciation appears in tires and battery to such an extent that it is actually cheaper to keep a single electric standing than it is a single horse and wagon. This is nicely brought out in the curve shown on sheet No. 3, where the comparison in cost in dollars a year is shown between the electric and the horse for various numbers of average miles a day from 0 to 34. You will note that when both electric and horse are idle there is shown a saving per unit of nearly \$140 a year. This saving gradually decreases when both are used up to a point at which the horse is doing his limit of 17 miles a day, when suddenly the curve shoots up to nearly \$350 a year as a saving as soon as the 17-mile limit is exceeded. From this point on to 34 miles a day where both horses are working their full limit there is then shown a saving of approximately \$200 a route a year in favor of the electric.

If then, we draw a line between the two extreme points of the horse vehicle curve and a point P bisecting line 5, 5' we will have a fairly accurate representation of the horse vehicle cost curve for various average daily mileages.

I would also like to have you note that were we to continue both horse vehicle curve and electric vehicle curve to the left and past the zero point they would apparently meet at negative values for both "cost in dollars a route a year" and "average daily mileage", or in other words, the cost for horse delivery and electric vehicle delivery is the same, only under imaginary or impossible conditions.

But, you say, and your question is a fair one, where are the figures from which the above were compiled, and in answer to this let me show you sheet No. 4, having 10 columns of figures, each column numbered and totalled and corresponding with a similar number on sheet No. 3.

Column No. 1 contains all the horse vehicle costs (and in

this particular comparison driver's wages have been included) for a single horse and wagon when standing idle, but ready to do service. Column No. 2 contains similarly all the fixed operating and maintenance charges for the electric vehicle when it is also standing idle. The totals of each column are then used to get the first points respectively for the horse vehicle and electric vehicle cost curves and shown on the curve sheet previously referred to. As above stated, the mileage radius in the first case is zero, or in other words both horse and electric are standing idle. Before leaving column No. 2 let me call your attention to this fact; namely, that I have charged against the electric \$22 for tires, assuming that these will actually be worthless in four years even though they are not operated a single mile. Similarly, I have charged against the battery item a figure of \$50 annually for nothing more than gradual depreciation due almost entirely to age.

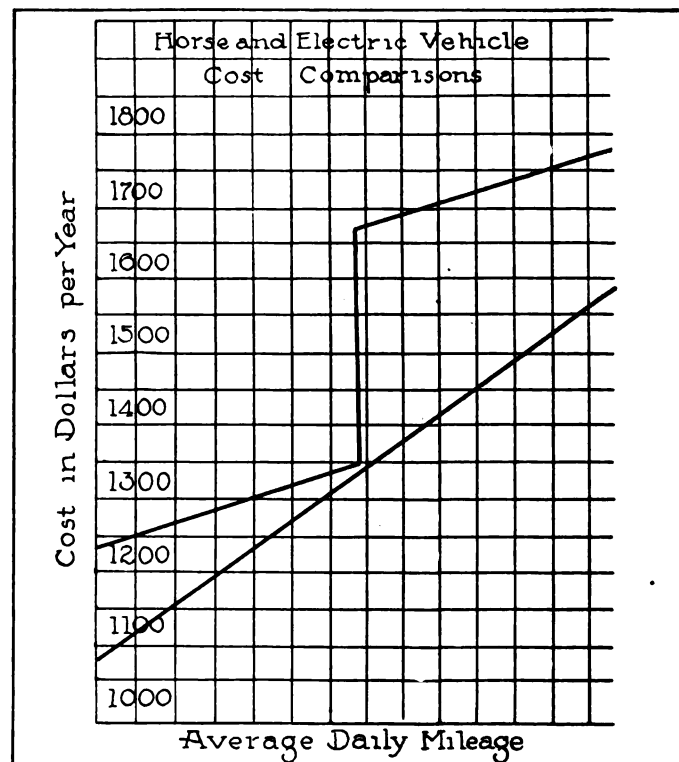
Points three and four were then taken at 8½ miles on account of their being half-way between the zero limit and the maximum limit of 17 miles for the single-horse wagon. Obviously the remaining points were taken at 17 miles, 25½ miles and 34 miles per day.

Square Foot Garage Charge.

For convenience all the way through, the so-called garage charge and the stable charge have been apportioned largely on the basis of a square foot charge, although I have actually obtained figures from livery stables in New York based on storing and washing an electric vehicle in service as low as \$7 a month, exclusive of adjustments and current, while the maximum figure quoted was only \$10 a month for the same service.

Let me also state that these figures were obtained from livery stables where \$30 a month was charged for storing a single-horse wagon and storing and feeding the horse. Please note also the cost figures under the heading of "extra horse" in the last column and the total of which cost figures, \$328, was used when the horse vehicle curve on sheet No. 3 took the sudden jump after the 17-mile limit was reached.

It is only fair to say that these costs represent both horse and electric when operated under favorable conditions and barring accidents and with fire and liability insurance omitted on account of the great variation in different localities. However, these figures, and the curve on sheet No. 3, representing their relation to each other, prove conclusively along with the actual cost figures given on sheet No. 1 and 2 that:



Graph Showing the Relative Costs of Using Horses and an Electric Wagon to Perform a Given Work.

"A single electric against a single-horse wagon can do the same work for less money regardless of the mileage".

The Pittsburg section has been organized with W. A. Donkin of the Duquesne Light Company, chairman; T. H. Schoepf of the Westinghouse Electric & Manufacturing Company, vice chairman; J. A. Jaques, Western Electric Company, secretary. The formation of the section was the result of the unification of all of the electrical interests of the city and vicinity, and the general desire of all to stimulate the use of electric equipment for the common good of all concerned. The Pittsburg section is the eighth organization composing the national body, the others being located in New York, New England, Chicago, Philadelphia, Washington, Cincinnati, San Francisco and Los Angeles. There is reason to expect the formation of several

TRUCKS FOR MILITARY SERVICE.

The motor wagons and trucks in the service of the United States army are purely experimental in the sense that a number of different types have been bought and the work of each is being observed. Naturally, such observations must extend over a considerable period before definite conclusions can be reached. The War Department has sought to have machines built to specifications prepared by its experts, but as these would differ materially from standard productions, and would in every sense be special the manufacturers refused to consider them except for considerably increased prices, which would vary with the number built.

Very recently the War Department sought to obtain bids for vehicles standard with manufacturers, disregarding its own specifications, and found, despite the urgency of its needs, that the bidders could not immediately supply the machines. This condition emphasizes the value of the policy of subvention of several European nations, and, with the constantly increasing need of motor vehicles for national service, the purchase of equipment that may be transferred from one governmental department to another should occasion require. Co-operation

HORSE VEHICLE AND ELECTRIC VEHICLE COMPARISON.										
0 to 34 Miles.										
Column No.	1	2	3	4	5	6	7	8	9	10
Capacity 1000 pounds.....	H	E	H	E	H	E	H	E	H	E
Radius	0	0	8 1/2	8 1/2	17	17	25 1/2	25 1/2	34	34
Speed	6	10								
Price.....	\$650	\$1650								
Repairs and paint.....	—	—	32	41	65	82	97	123	130	165
Shoes and veterinary.....	25	—	35	—	45	—	80	—	90	25
Tires (four years)	—	22	—	38	—	54	—	70	—	86
Battery (six years).....	—	50	—	75	—	100	—	125	—	149
Current	—	12	—	35	—	70	—	105	—	140
Feed and bedding.....	180	—	200	—	220	—	420	—	440	180
Garage	—	80	—	90	—	100	—	110	—	120
Stable	180	—	180	—	180	—	270	—	270	90
Driver	750	750	750	750	750	750	750	750	750	750
Depreciation	65	127	65	127	65	127	90	127	90	127
Interest	20	50	20	50	20	50	27	50	27	50
Insurance (fire and liability)	—	—	—	—	—	—	—	—	—	—
Total.....	1220	1091	1282	1206	1345	1333	1734	1460	1777	1587
Extra horse	—	—	—	—	328	—	—	—	—	—
Total, two horses, one wagon	—	—	—	—	1673	—	—	—	—	—

"H" = Horse.

"E" = Electric.

other sections in cities of the Middle West during the next two months.

of the government and the industry would be a highly desirable result.

CAPITAL STOCKS INCREASED.

The Lewis Spring & Axle Company, Jackson, Mich., has been increased from \$350,000 to \$700,000, this being necessary because of the general development plan recently decided on and the greater activities of the company. The capital of the E. C. Clark Motor Company, recently acquired by the former organization, has also been increased from \$15,000 to \$265,000.

A new factory at Richmond avenue and East Grand boulevard, Detroit, Mich., has been purchased by the Aetna Motor Truck Company of that city, and it will shortly be occupied. The purpose of the company is to build 200 machines during the coming year.

At its recent convention at Worcester, Mass., the National Metal Trades Association elected H. H. Rice, vice president of the Waverley Company, Indianapolis, Ind., its executive for the year to come.

NEW DEPARTURE FIRE DEPARTMENT.

In addition to the protection that is afforded by the fire department of Bristol, Conn., the plant of the New Departure Manufacturing Company is safeguarded by the factory fire brigade, which has been organized, equipped with apparatus and installed in the former office building of the works. The magnitude of the company's property and the limited resources and facilities of the town fire prevention organization impelled training the workmen and equipping them for emergency duty.

The Autobus Service Corporation has been organized at Santa Rosa, Cal., which has inaugurated a motor omnibus service in several sections of Sonoma county, that state.

M. L. Pulcher, for a considerable length of time general manager of the Federal Motor Truck Company, Detroit, Mich., has been elected a vice president of that concern.

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Devoted to Motor Driven Business Vehicles of All Classes.

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No. 8

TRUCKS BIG FACTOR IN EUROPE'S WAR.

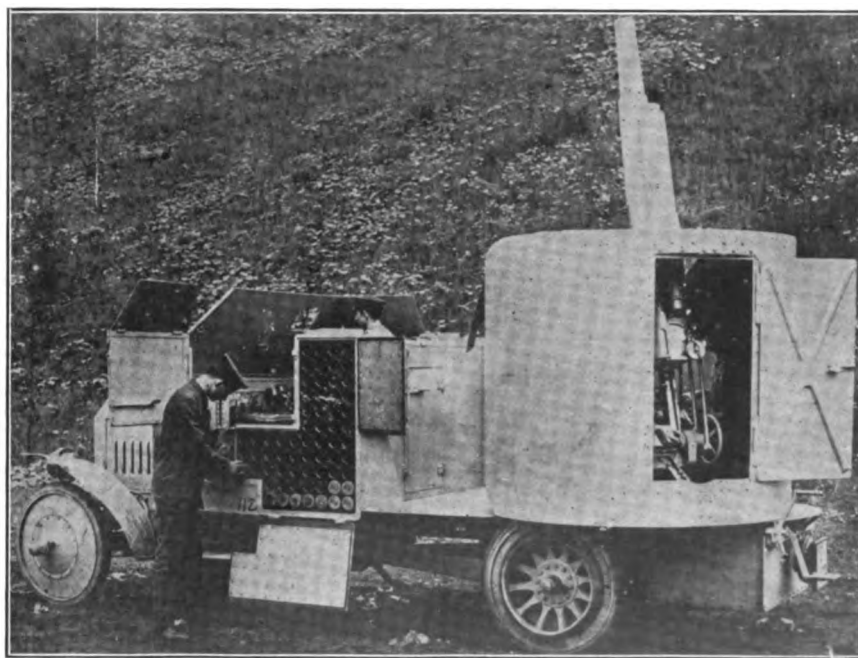
Enormous Demands for Motor Transports, Far Exceeding Subsidized Vehicles, Results in Commandeering of Public Service and Private Machines---Special Equipment Absolutely Inadequate---Subsidization Policies Abroad.

DESPITE the training of millions of citizens for military purposes, the expenditure of vast sums of money for what are regarded as the most effective armaments and the construction of series of fortifications for defense, the efficiency of the armies of the nations now warring in Europe will be governed by transportation facilities. And though arms of all types have been wonderfully perfected and are now the most destructive that the world has ever known, the means for moving the forces and supplying them with food and munitions while in the field are but little if at all superior to those that were the vogue centuries ago. This statement, however, applies to offensive operations in another country rather than to a defending force.

An army is usually made up of three branches, cavalry, infantry and artillery, and as the movement of the organization is dependent upon the least mobile section, which may be either infantry or artillery, and as railroads are not practical for advances because of the necessity of insuring against attack, invasions are generally made by highways or through open country where the first prin-

ciples of military activities can be resorted to. In theory, an advancing column of troops must clear its route of all obstructions, either opposing forces, fortifications or natural obstacles, and when in undisputed possession of the country must have direct communication with a base of supplies, as well as an avenue for retreat should this necessity arise.

Wherever a railroad can be utilized without danger of attack transportation is merely a matter of organization and detail, and a large force of men can be moved with comparative rapidity for considerable distances, but when an army begins operations of invasion its movement may be very slow. From 10 to 15 miles a day overland will approximate the average unobstructed progress of an army, this being about the



Armored Quick-Firing Aeroplane and Balloon Destroyer, Used by the German and French Armies.

limit of endurance of both men and animals.

In Germany a large part of the railways are owned by the government, while in France the majority of the principal lines are similarly controlled, so that these are always operated by organizations that may be taken over with an assurance of at least normal efficiency. These railroads have been used for the mobil-

ization of troops at strategic points, and from these advances have been made by highway and across country. In France the roads are divided into three classes, the routes national, which were constructed with particular reference to military operations, the routes departmental and the routes commune. The routes national are direct and afford communication between principal points, and while these are particularly useful in the event of offensive activities, they offer equal opportunities to invading forces, although strongly fortified.

The roads of Germany are not constructed with the same system as are those of France, and yet the necessities of military operations and commerce developed highways that extend through the principal river valleys and across several passes into the French frontier. Because of the development of roads by centuries of use the conditions as regards highway transportation in France and Germany are different

tiers, and the troops that have been mobilized have generally been in communication with established bases of supplies, from which forward movements have been begun, but as the magnitudes of the armies are increased, and the distances between bases are greater, especially when railroad facilities do not exist or are not available, dependence will be either upon animal or motor transports. The demand for transportation will be enormous. Not only will equipment be utilized to the greatest degree of practicability, but there is probability of constant loss, and these factors are deserving of especial consideration.

With this extreme demand the necessity of transportation units that will have the greatest degree of serviceability, which can be worked to any extremes, is apparent. Army service requirements may entail almost constant usage for considerable periods of time, carrying heavy overloads. Animals can be worked beyond normal haulage only at great sacrifice

of utility. They must receive attention, have food and water, and rest is imperative. Horses have not the endurance of men, who can avail themselves of whatever will conserve strength and obviate labor. For this reason infantry can, in emergency, make forced marches that will be considerably in excess of distances and at faster speeds than can be made by road trains.

Big Demand for Vehicles.

England, France, Germany, Austria and Russia, so far as outward indications are concerned, never anticipated, despite the extreme degree of preparedness for war, anything like the complication of conflict that exists,



Daimler Omnibus Used for Public Service in Berlin, Many of Which Have Been Converted to Transport Service for the German Army.

and, as a rule, decidedly better than in any other section of Europe, so they are hardly comparable with any part of the United States, save in some parts of New England.

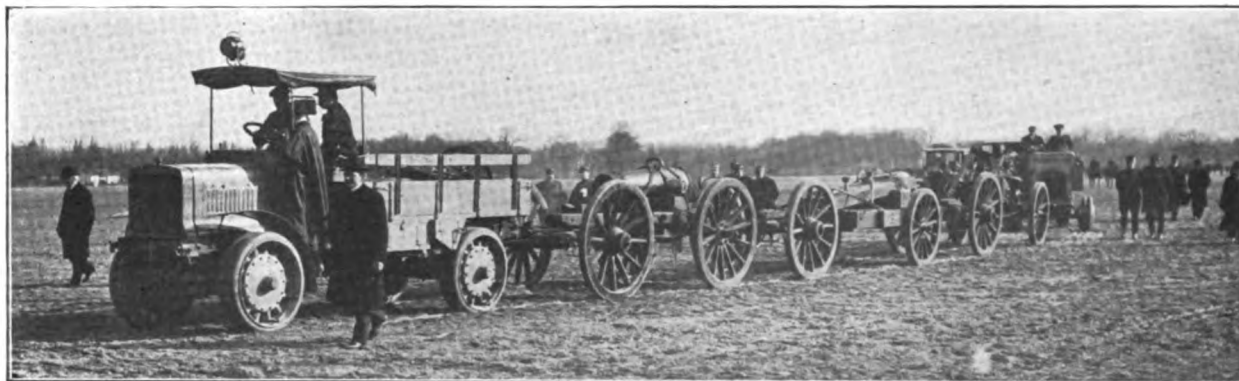
The general war in which Germany and Austria are arrayed against England, France, Russia, Belgium and Servia, with the probability of other nations becoming involved, has precipitated a situation such as the world has never before experienced, and the forces that will eventually be engaged will number millions of men and require such enormous quantities of stores that the problem of transportation will be of tremendous proportions. In fact, the statement that on transportation efficiency will depend either success or failure of any nation that is either taking the offensive or defending itself, is not too broad.

The operations have thus far been along the fron-

iers, and the facilities for highway transportation have been gathered largely from commandeering after the very limited number of machines provided for by subsidy had been ordered into service. Because of the great importance of military movements, battles and skirmishes, and the innumerable topics incidental to national policies, comparatively little information has reached the outside world relative to detail, and the briefly stated facts indicate that each nation involved pressed into the service of the armies all the vehicles that were suited to the varying purposes, or such as occasion demanded. When the machines that can serve in any way have been acquired, the armies will of necessity be compelled to use animals.

Freight Vehicles Available.

Considering the situation for a moment, automobile vehicles, pleasure cars, wagons and trucks, are by no



Example of the Transportation of Heavy Ordnance by the French Army, the Gun and Carriage Being Mounted on the Trailers.



Trying the Capacity of Tractors and Trailers in French Army Manoeuvres, in Conditions Judged to Represent Service Requirements.



Typical Demonstration of Utility of Motor Road Trains to Transport Field Artillery in French Practice Operations.

means as plentiful in Europe as in America. While the best statement that can be made will be an approximation, a reasonably definite conclusion can be reached so far as numbers are concerned. In England the total is about 250,000, of which from 20,000 to 25,000 may be classed as wagons and trucks, the remainder being pleasure cars. The total number of automobile vehicles in Germany of Jan. 1, 1914, was in round numbers 90,000, of which about 9,000 were wagons, trucks and tractors. The number of machines credited to France is 93,000, and about 10 per cent. of this total is trucks, wagons and tractors. An estimate of the number of Austrian owned automobiles is about 25,000, and less than 10 per cent. are adapted for freighting. Russian owners have perhaps 10,000 vehicles of all kinds, a very small number being available for freight transportation, while Belgium has not more than the number owned in Russia. Servian citizens have so few that they are hard-

insure efficiency, the total owned by the different governments is comparatively few. Instead of owning motor trucks and maintaining them in constant readiness for service, subvention or subsidization has been resorted to, a policy that is followed by England, Germany, France and Austria. Russia and Italy have purchased outright a small number of trucks, these being of the lighter types.

France and Germany undoubtedly have the best motor transports available for the use of the armies, because of the longer continuance of the subsidization policies, and the more exacting requirements, while England and Austria have by no means as many as the first two nations mentioned.

The Ideal Army Transport.

Perhaps to best understand the conditions a statement should be made of what constitutes an ideal motor army transport. Standardization is essential for numerous reasons, but this has not as yet been required by any country, simply from the fact that to do this would necessitate governmental production. In service of any kind repairs will be necessary, and the desirability of having machines that are known and understood by the mechanics who shall work upon them, interchangeability of parts to facilitate restoration, and a store of standard spares which will positively fit, as well as having drivers who can operate any machine equally well, are factors of extreme importance.

Without standardization these factors cannot obtain. Not only this, production of a standard type of vehicle would greatly reduce the manufacturing cost and continuity of service. The general policy of nations has been to standardize military and naval equipment so far as possible. Army transportation necessitates heavy work in



Type of Omnibus Generally Used in England, Many of Which Have Been Withdrawn and Placed at Disposal of British War Office for Army Transports.

extreme conditions, and great endurance is considered before all else. A construction that might be regarded as too heavy for commercial or industrial highway haulage would probably be regarded with favor by military experts, provided that sufficient power was developed.

ly to be considered. These figures include all vehicles built for passenger service, omnibuses, taxicabs, etc. While there is a possibility that many of the machines of large passenger capacity will be utilized, because they have power and speed and can be worked to good advantage, the conversion of pleasure cars will hardly be resorted to, for the experience has been that such vehicles are not sufficiently enduring to justify serious consideration, while the load capacities are such they cannot be used efficiently.

No Preparation for General War.

The possibilities of motor vehicle transportation in the event of war have been recognized by European nations, but because of the condition of the industries of the several countries, and the character of the demands of the service for which they were desired, as well as the enormous expense that would be entailed by the purchase of a sufficient number of machines to

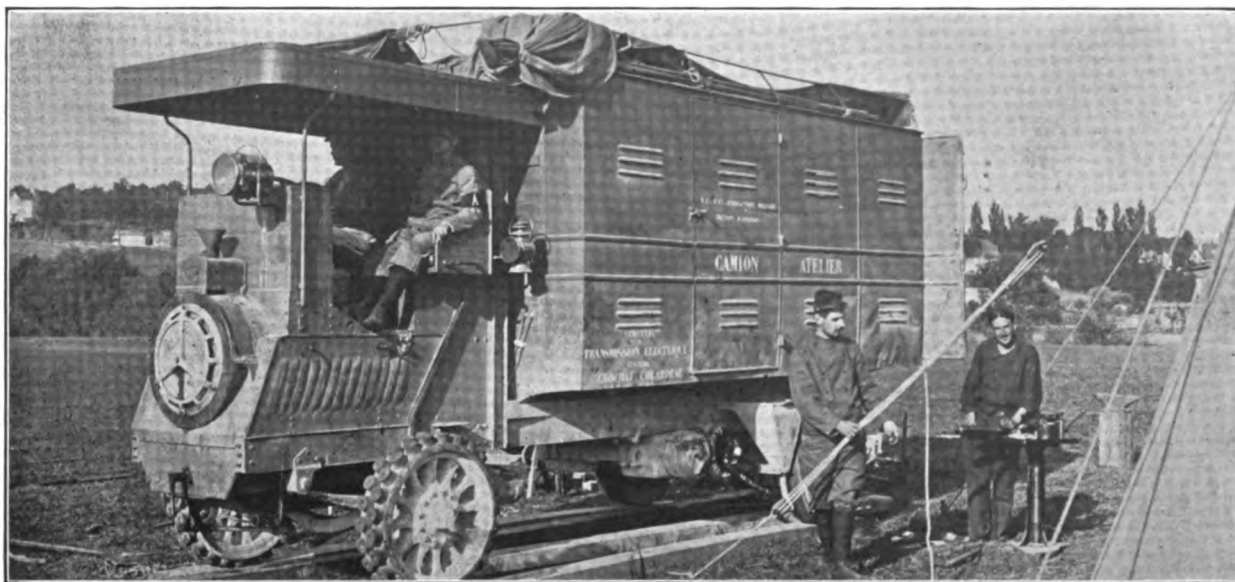
insure efficiency, the total owned by the different governments is comparatively few. Instead of owning motor trucks and maintaining them in constant readiness for service, subvention or subsidization has been resorted to, a policy that is followed by England, Germany, France and Austria. Russia and Italy have purchased outright a small number of trucks, these being of the lighter types.

How Transports Must Be Worked.

Though a truck or tractor adapted for army service would be as serviceable on a good highway as any other type, its greatest value would be when worked in cross country haulage, where tracks or paths or fields must be traversed, and where great power and fullest traction is necessary because of the soft surfaces, steep grades, and other obstructions that may be encountered. In such conditions a machine may be driven with full load, and, quite frequently, with overload. When need is urgent, progress must be made at all hazards, and a definite result must be accom-



Field Aeroplane Hangars, Designed to Follow Airship Scouts of the French Army, That Are Drawn by Fast Trucks.



Armored Motor Truck, Equipped with Facilities for Repairing Aeroplanes and Doing General Field Work.



Motorized Equipment Specially Built for the Service of the Sanitary Corps of the French Army.

plished. With other works delays are not of vital importance, but the movement of an army is absolutely dependent upon the transportation of its supplies and munitions, and the vehicles must keep pace with it to insure satisfactory conditions.

France First to Subsidize Trucks.

France was the first nation to materially promote the motor vehicle industry with a view of developing commercial possibilities, and later on it applied subvention to the production of road transports for army service. It has since 1909 systematically developed trucks and tractors that have been proven in the government trials to meet all requirements, and these tests have been of sufficient duration and in conditions that were as nearly parallel to anticipated service work as exacting officials could devise.

Germany has nearly as systematically developed the machines that are built for army work, and these have been tested in practise marches and military

has attempted to establish a standard of design, to which machines must be built before they can be subsidized. In a general way the reasons for standardization have been stated, but that which has the greatest weight is the necessity of maintaining them in operations such as are now in progress. Should several machines be so damaged as to be useless, restoration is practical with parts taken from one with such hand tools as might be carried. The value of interchangeability cannot be too strongly emphasized.

The theory of subsidization is based on economy, with the view of providing for a need that may be practically negligible during peace, but of varying proportions in the event of war. In a sense it is private and national co-operation. Whether or not subsidization of road vehicles is a sound business proposition from the viewpoint of either interest is not to be considered, but the general plans of England, France, Germany and Austria for providing army transports are of particularly timely interest.

France and Germany have in service, or available, greater numbers of machines of approved types than any other nations. Military expediency may have impelled the systematic development, for these two states have in every way sought to improve any character of equipment possessed by the other, with the hope of gaining practical, technical or fancied advantage. Not only this, adaptations of different vehicles have been made to serve specific purposes in which the economy of time has been the main object.



The Boulant Motor Field Hospital, Built Specially for the French Army, with Tents Folded and Ready for the Field—The Latest War Equipment.

manoeuvres, and different types of construction approved. No one standard was established, but a number of makes were found to meet with the general demands for field service.

Policies of Subsidization.

Subsidization, in the sense applied by England, France, Germany and Austria, differs considerably in detail, because industrial conditions are not alike. A custom of all European governments is to confiscate whatever is an essential for the general welfare of the nation, and officials do not hesitate to seize any property that may be necessary in an emergency, the owners' rights being regarded as secondary, and usually they are dealt with on the basis that an individual's business or interests had better be sacrificed than the people's. But only an extreme emergency would precipitate such action.

Of all the European nations that subsidize vehicles for army service, England is the only one that

The types of machines that have been approved by the different governments differ materially. France, probably because of the excellent highways of that nation and the general demand of its people for speed, at first demanded light units driven by shaft or chains with the traction wheels on the rear axle. Within the last two years heavier machines have been more favorably regarded, and trucks and tractors driven by all four wheels (vehicles of total adherence is the designation) have been looked upon as being the most satisfactory for heavy haulage. France has since 1909 promoted trials of trucks and tractors that have been organized by the minister of war, and the competition of 1914, the sixth annual event, was probably terminated by the declaration of war. It was to be concluded Aug. 4, having been begun June 29.

How Subsidy Is Awarded.

The French government stimulated the motor pleasure vehicle industry because of the obvious possibilities for the benefit of the people, but the promo-

tive influence of subsidization of army transports is not evident. The policy is briefly this: The government each year has made an appropriation of a definite amount to be awarded in subsidies to the owners of machines of the types that were approved by the minister of war following open competition, the payment of the premium to be made annually for four years if the vehicles were maintained in satisfactory condition. The manner of expenditure of each annual appropriation is definitely specified.

The German policy is said to be more promotive in character than that of France from the fact that until the needs of the army were understood, comparatively few trucks or tractors were built in that country, and the building of these machines is practically the result of the large amount of subsidy offered. The government makes annual appropriation of such amounts as will be sufficient to meet the estimated requirements for subvention, and the trucks are usually tried in connection with military manoeuvres, although in some instances special trials are organized. One trial at least was continued for about six weeks during winter weather. The owners of the types of machines that are approved are paid a premium in annual installments for five years, conditionally upon the vehicles being in readiness for use when requisitioned. The trucks approved for the German army, however, are generally heavier than those adopted for the French army and must have power to haul trailers when these are necessary.

The Austrian policy is similar to that of Germany, and because of the very generally hilly and mountainous character of the country the machines are required to have special features not usually desirable for private transportation service, such as limited weight and tread and comparatively slow speed. Trucks and trailers are approved, subsidy applying to equipment of two units.

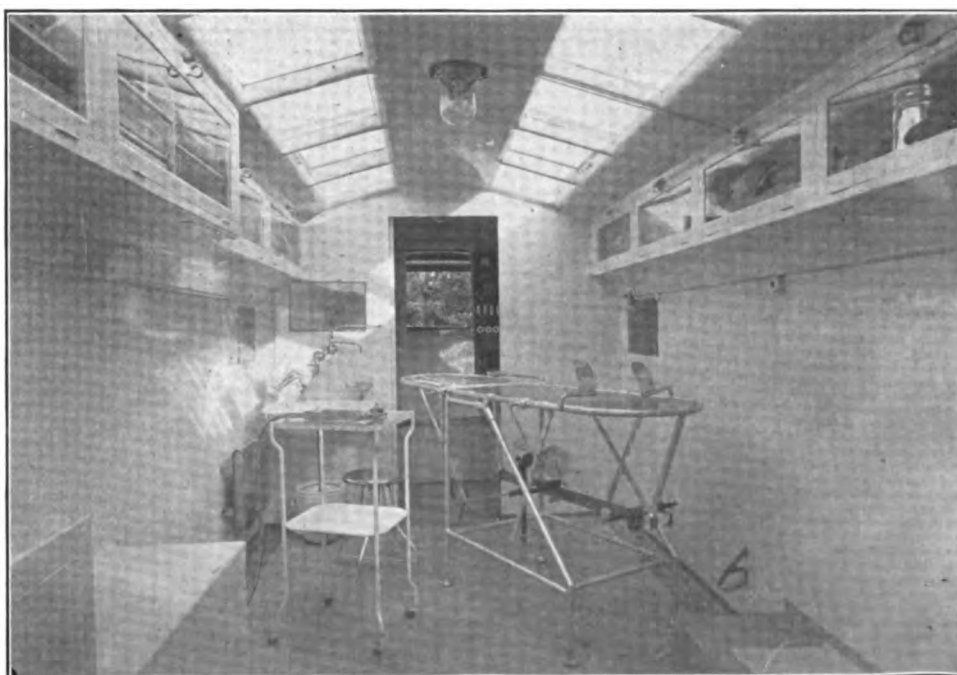
England did not take up subsidization of army transports as early as Germany and France, and not until 1912 was a definite policy deter-



Field Hospital on a Motor Truck Chassis, Showing the Equipment Ready for Service, Now with French Forces.

mined. This, however, differs from the others in that it comprehends the incorporation of certain specified standards; limited interchangeability of components and standardized means of control are desired, that the driver of one type will be qualified to drive any other without special training, while the shaft drive and live axle with bevelled master gear are approved instead of the chain driven machines that are subsidized in the other European countries.

Some of the components and designs that are standardized by the specifications issued by the British war office include the type of starting crank, joints for brake and other linkage, flywheel indications for engine timing, positions of control levers at various



Interior of the Field Hospital, Well Lighted and Fitted with Every Facility for Operating—A Novelty of French Army Equipment.

speeds, construction of fuel tank, sprag construction, type and method of attaching radiators, magneto installation and couplings, lamp brackets, cab design and lamp location, method of attaching body bolsters, forward and rear draft hooks, and the types and arrangements of the bodies. It will be understood that the motors, clutches and gearsets are not standardized.

Plans for 1000 Army Trucks.

The British subsidy plans were made with a view of ultimately having 1000 machines of two types available for the service of the army, but of course nothing like this number has been built to the subsidy specifications, and to provide for the army pending the building of the approved vehicles subsidies ranging from \$153.60 to \$249.60 are paid to owners of machines of approved types. The British subsidized vehicles are of two classes, known as A and B, and these are intended to have three and 1½ tons capacities. The English ton, however, is the long ton, or 2240

more tons useful load capacity, paid different sums (\$1440 is allowed for a three-ton machine) within periods of four years. Truck, trucks and trailers, tractors and trailers are approved. Average speed required nine miles an hour.

Germany—Approved types of vehicles, maximum useful load capacity, four tons on trucks and two tons on trailers, paid \$2160 in five years. Only trucks with trailers are approved. Maximum speed 10 miles an hour.

Austria—Approved types of vehicles, maximum useful load capacity three tons on trucks and two tons on trailers, paid \$1728 in five years. Only trucks with trailers are approved. Maximum speed 10 miles an hour, average speed six miles.

Italy has approved the use of 1¼ and 2½-ton trucks for army service, but these are bought by the government and are permanent equipment. The number available is by no means as large as is practical



White 1500-Pound Wagon Owned by the Russian Government—This Picture Shows the Czar, at the Right of the Telegraph Pole, at the Close of 2000-Mile Trial of Army Transports, Inspecting the Vehicles—Following the Contest the Government Bought a Number of the Whites, but a 3000-Pound Load Capacity Type.

pounds, and what is known as a cwt. or hundred-weight is 112 pounds. The classes are thus defined:

	Class A	Class B
	Tons Cwt.	Tons Cwt.
Useful load	3	1 10
Three men on driver's seat at two cwts. each	6	6
Kit, spares, fuel, tires, etc.	2	2
Heaviest body probably used.....	19	17
Cab	3	—
Total weight on chasses.....	4 10	2 15
Gross weight of vehicle and load, not to exceed	7 10	5 10

Comparison of the subsidies paid by the different powers of Europe is decidedly interesting, and it can best be shown in the following summary:

England—Standardized types of vehicles, of 1½ and three tons useful load capacities, paid totals of \$528 and \$576 respectively in periods of three years. Trucks only are approved. Maximum speed is 16 miles an hour and average speed 12 miles an hour.

France—Approved types of vehicles, of two or

under the subvention plan. The policy of Russia is the same as that of Italy, but the approved sizes of trucks are 1½ and three tons.

The total number of transports that any nation has or did have available is largely a matter of speculation, but there is no question that the aggregate of all the military operations will require many thousand machines. The statement has been made, assumedly upon good foundation, that in the event of mobilization England alone would require 1442 motor trucks and 239 road trains drawn by tractors or traction engines, for communication between a base and a front (assuming a large expedition was sent forth) and 7274 carts and wagons, or a total of 8955 vehicles of all kinds. But no statement has been made as to the number of men that would be served with this equipment. These figures may be merely approximation, but they will serve to illustrate the enormous number of transports required by the vast armies now in the field.

Special Motor Equipment.

In addition to the regular transports a considerable number of motor vehicles of special design and construction are in service. There is no doubt that so far as possible the field artillery will be hauled by motor trucks, the French and German armies being equipped with trucks that draw from one to three trailers. Transporting field guns, the cannon may be mounted on one trailer, the carriage on another and the ammunition on the third, the truck carrying whatever useful load, entrenching tools, etc., that may be required. With heavy siege guns, however, different methods of transportation may be necessary.

All of the European armies are accompanied by squads of aviators, who do scouting with aeroplanes, and provision is usually made to protect these men and their equipment so far as possible. The French army has, according to credited statement, about 3000 aviators in its service, and a correspondingly large number of aeroplanes. In many instances the aviation corps are accompanied by portable hangars, consisting of a canvas-covered frame mounted on a two-wheeled chassis, which can be coupled behind a light fast truck that is equipped with a special body. These trucks can be driven rapidly and the hangars can be taken from place to place and located advantageously for the aviators.

The trucks carry all supplies and parts necessary for repair or restoration, and where a considerable number are gathered a special form of motor repair shop, this being a large truck chassis with a big armored body, is attached. These repair shops are exceedingly complete, carrying material of all kinds, hand and machine tools, and electric motors driven by the engines, which furnish power for machine tools on portable stands that may be set up in a field or any convenient place. Even a small forge and an anvil are included in the equipment. The motor repair shops are driven by power engines and can be taken anywhere that roads exist, or through reasonably open country. The crews of these machines are expert mechanics, who are qualified to do work of any kind, either on an automobile vehicle or an airship.

Motor Aeroplane Destroyers.

Aeroplane scouting for an army has undoubted fascination, but besides the usual dangers to which aviators are exposed, there is the probability of being fired on by rifles and cannon. The French and German armies have each several aeroplane destroyers—possibly a considerable number of them—which are fast armored motor truck chassis, carrying rapid-firing cannon mounted in roofless steel towers, that are designed especially for firing shells at airships. The guns fire special types of projectiles weighing 4.1 kilograms with muzzle velocity of 670 meters, which corresponds to an energy of about 93.8 meter-tons. The maximum range of the guns is approximately seven miles, the shells having an ascent of 3700 meters at 45 degrees angle and 7910 meters at 75 degrees angle.

The train of the gun extends a considerable dis-

tance above the walls of the turret. The estimated distance of the aeroplane or ballon is ascertained at sight by a hand wheel that acts independently of the pointing angle and the angle of the ground, after which aim is made by a telescope with an immovable eyeglass. Deviation from twist is automatically corrected. The gun and the operator are protected from rifle fire, while the mechanism of the chassis is thoroughly armored. The ammunition is supplied from cases at the side of the chassis.

Boulant Motor Field Hospital.

The French army has several Boulant field hospitals in service, these being motor truck chassis which are in equipment thoroughly practical from the viewpoint of the surgeon, though of course limited as to capacity. The hospitals consist of very long motor truck chassis fitted with wide bodies that are divided into three compartments, the forward division containing electrical apparatus, the middle being the operating room and the rear section containing the radium apparatus. The chassis is lighted by roof windows and dome lights and in the operating room are located the tables, stands and other necessary paraphernalia. The forward compartment apparatus will sterilize 15,000 liters (about 2000 gallons) of water a day by ultra-violet rays. At either side of the chassis are folding tents that may be set up for hospital purposes, the chassis itself being too small to permit the patients to remain there. Of course every hospital requirement is provided. The machine has a speed of about 18 miles an hour and is intended to accompany troops in service, or when necessary the hospital can be located at any convenient place for any required period.

Sanitation and Hospital Corps.

The necessity of careful sanitary supervision of the forces while in the field has resulted in the organization of special corps that accompany each section of the French army, these being divided into squads that make examination of the localities where encampments are made and so far as possible safeguard the health of the troops by requiring strict observance of regulations and special orders. These squads are furnished with specially equipped motor vehicles that are provided with such supplies as may be desirable. The belief is that the sanitary squads will minimize sickness through expert knowledge of conditions that will be met with.

The use of the deadly armament of the different armies means that thousands will be killed and injured during the engagements, and the lives of a considerable percentage of those who are wounded will depend largely upon the efficiency of the hospital corps. Each army has the normal organizations that are devoted to treatment of the disabled soldiers, but in removal of the injured from the fields to convenient places for hospital attention, motor vehicles will undoubtedly be largely used. Regular ambulances are provided, of course, but because of the number necessary in each serious engagement pleasure cars of all

kinds are placed in service. In some instances omnibuses have been used for conveying the wounded, these having large capacity and being built for hard work.

Omnibus Drivers for Transportation.

The British war office has made demands upon the London omnibus and cab companies for vehicles, as from time to time these will be taken wherever needed, although no information is obtainable regarding the uses made of them. The omnibuses, however, can be used for transportation between bases and the active operations, for the carrying of wounded and haulage of supplies, they being adapted for varying purposes. The French minister of war has also commandeered a considerable number of the omnibuses in the service of the Paris public service companies, and these are utilized for general transportation. During the army manoeuvres a year ago omnibuses were used for transporting meats, these carrying satisfactory loads and thoroughly protecting them from dust, storms, etc.

The problem of obtaining capable and experienced drivers will be a task of considerable magnitude, for these men will undoubtedly be required to work extremely hard, as well as being exposed to varying dangers from attack by enemies and the necessity of taking long chances at times. The English government has, according to general understanding, approached the large transportation companies with the view of obtaining the services of regular drivers employed by them, enrolling the chauffeurs as soldiers for the period of time they may be required for army work.

Big Problem of Maintenance.

Because of the innumerable makes of machines and the utter impossibility of having available spare parts that may be necessary for restoration in the event of accident or damage, the maintenance of the vehicles in operative condition will be work that will try the most resourceful drivers and mechanics. Where conditions will permit field repair shops will no doubt be resorted to, although there is probability of depending upon utilizing such facilities as can be found in the works and factories of the localities contiguous.

One may be certain that the machines will not be spared work, so long as men can be found who will drive them, and operating conditions will not be improved as the war progresses. But there is reasonable ground for believing that motor transports will have material influence upon the result. Incidentally the cost of fuel will be very large, because of the vast quantity that will be required, and it will have to be obtained, no matter what the price. Alcohol and benzol have been used to some extent abroad, but the supplies of these available is comparatively small.

WILL BUILD ELECTRIC VEHICLES.

The Dunlap Electric Truck Company, Columbus, O., which was organized recently with a capital of \$20,000, has completed its first model, which was inspected by representatives of the General Electric Company. The truck is chain driven and carries a load of 750 pounds. In the test it carried 1350 pounds. It develops a speed of 12½ miles ordinarily, and has an emergency speed of 15 miles. The axles are tubular and carry the F. & H. wire wheels. The incorporators of the company are T. C. Dunlap, George H. Hedhes, Stewart A. Hoover, Herman R. Tingley and M. E. Heasley.

WHITE 24-PASSENGER CHAR-A-BANC.

A vehicle that is unusual in America, and yet has proven very popular abroad, is a White truck chassis that is fitted with what is known as a char-a-banc body and is operated for regular passenger service between Portland, Ore., and Chanticleer, a summer resort located on the Columbia river, with occasional service to Cascade Locks. The machine is a standard construction, but the body is built practically as is that of a touring car, with five transverse seats back of the driver's seat, each of which will accommodate four persons, the normal capacity being 24 passengers. The seats are enclosed with side doors, affording the occupants full protection, and there is convenient access from the long running boards, which are extended back of the rear fenders to meet the requirements of the two rear seats. Instead of the conventional standing roof, however, the machine is fitted with a folding top, to which side curtains may be attached in the event of storm. The arrangement of the vehicle is pleasing to the passengers and the service has been particularly well patronized. There is probability that several others of similar design will be constructed for use in the Northwest.



White Chassis Fitted as a Passenger 'Bus with a Char-a-Banc Type of Body, Seating 24, Operated Between Portland and Chanticleer, Ore.

NEW YORK RATES FOR CURRENT.

Reductions in rates charged by the New York Edison Company for electricity during the past three years may be taken as evidence of the increasing use of electric vehicles. Prior to July 1, 1911, the rate averaged approximately $3\frac{1}{2}$ cents per kilowatt-hour. Between July 1, 1911, and May 1, 1914, the cost was reduced to less than $3\frac{1}{4}$ cents, and on May 1, 1914, the minimum, based upon the consumption of 50,000 kilowatt-hours monthly, was reduced to two cents a kilowatt-hour.

The new rates, upon a minimum monthly bill of \$25, are as follows: The first 2500 kilowatt-hours monthly at five cents; next 2500 kilowatt-hours monthly at four cents; next 5000 kilowatt-hours monthly at three cents; next 20,000 kilowatt-hours monthly at $2\frac{1}{2}$ cents; next 20,000 kilowatt-hours monthly at $2\frac{1}{4}$ cents; more than 50,000 kilowatts, two cents.

LARGE INCREASE OF SALES.

At the annual meeting of the stockholders of the Four-Wheel Drive Auto Company, held in Clintonville, Wis., the articles of incorporation were amended, increasing the board of directors from seven to nine. A. Kuckuk of Shawano, Wis., and A. W. Priest of Appleton, Wis., were elected as directors. Directors then declared a four per cent. dividend on stock of record June 30, 1914. Sales for past year for Four-Wheel Drive trucks showed an increase of 165 per cent. over 1913.

NEW BOSCH SERVICE STATIONS.

The Bosch Magneto Company has added the following to its list of service stations: Pollard Auto Company, Nashua, N. H.; Weeks Garage, Patchogue, N. Y.; Harnell Garage, Babylon, N. Y.; Reilly Bros. & Raub, Lancaster, Penn.; LeJeal Cycle and Mobile Works, Erie, Penn.; Eric J. Gustafson, Rockford, Ill.; Lawrenceville Auto Company, Lawrenceville, Ill.; Cadillac Motor Car Company, Mobile, Ala.; Gibbes Machinery Company, Columbia, S. C.; J. F. Charley Auto Company, Evansville, Ind.; C. A. Gosars Auto Company, Washington Courthouse, O.; New Jersey Auto and Supply Company, Camden, N. J.; Central Auto and Supply Company, Jackson, Mich.; Shrive, Inc., Yonkers, N. Y.; Mattoon Motor Car Company, Mattoon, Ill.; Ward's Vulcanizing Works, Concord, N. H.; Ripowan Garage, Stamford, Ct.

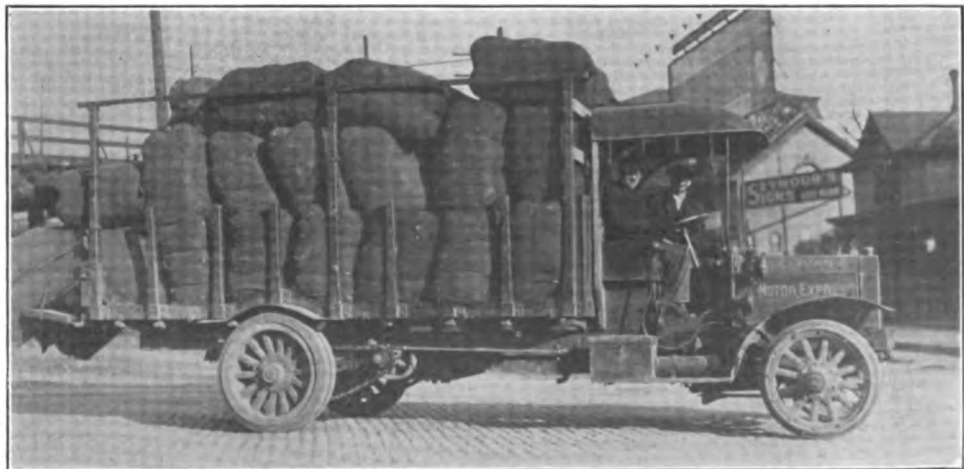
HARD-WORKED TRUCKS.**Peerless Machines That Are Driven 70 Miles Daily in Transport Work.**

The Sullivan Motor Express Company, Providence, R. I., has in its service four Peerless three and four-ton trucks that are driven from 65 to 70 miles each day in regular transport work, carrying capacity loads practically the full distance. This company has used machines for nearly two years and it has increased its equipment with the demands for service.

This work is in direct competition with the New Haven road, and it is practically devoted to the needs of several mills, both in Providence and Woonsocket. The Providence manufactories are at Olneyville, a section about two miles from the centre of the city, and at these yarns are spun that are woven by mills at Woonsocket.

The raw material is generally received by steamer at Providence, hauled to the Olneyville mills, made into yarn, sent to Woonsocket and made into cloth and returned to Providence for shipment by water lines. For years the yarn and cloth were hauled by rail, the distance of 16 miles being too long for economical work with animals, and the haulage between the mills and terminals was done with horses. But this necessitated as many handlings and as great expense for this work as though the shipments were thousands of miles. In addition, the freight rate for the distance was proportionately much greater than for decidedly longer distances.

The Sullivan company had hauled the raw material from the piers to the Olneyville mills, and the yarn from these mills to the railroad terminals and water lines. A proposition was made to the mills to do the haulage between the cities, taking the loads from mill to mill and from mill to pier, eliminating the handling, save the original loading and unloading, at a decided saving of time and lessening of expense. The service of the railroad was what was convenient



Four-Ton Peerless Truck with Special Body Operated by the Sullivan Motor Express Company Between Providence and Woonsocket, R. I.—The Machine as Shown was Loaded with Bales of Wool.

for it to afford and delays were frequent and annoying. The truck haulage could be controlled to meet the exact requirements.

These factors were of material importance and the mills decided to try the truck transportation. The result was in every way satisfactory. From eight to 24 hours were required with an average railroad shipment between mills, and the trucks reduced this to two hours, and the cost of freightage was somewhat reduced. The trucks have been operated in this work for nearly two years, the number being increased from one to four, with the possibility of still greater service being developed. Two round trips are made each day save Saturday, and occasionally an extra trip or two is necessary. In addition to this, each truck makes a trip from Olneyville to the Providence piers in the morning to haul loads of raw material, so that as a rule the daily mileage will range from 65 to 70. Because they are operated with capacity loads practically all the time the trucks are earning money for every mile driven, and there is but little unproductive mileage, the only time when full freights are not carried being between the Providence mills and the piers.

The service is organized to meet the requirements of the mills and changes of any kind can be made with certainty that the needs will be met and that the work will be done so as to serve the best interests of all. There is a decided saving of time and a considerable economy in haulage, when the expense, aside from the actual freight rates, is considered. With an experience of sufficient length to include every climatic condition that might be conjectured, and to fully demonstrate the serviceability of the machines, the results have been in every way satisfactory, and there is a probability of even greater economy as the work can be better adapted and more fully systematized, or, perhaps, conditions changed. In any event the mills are relieved of the necessity of maintaining transportation departments, they are certain of whatever service may be required, and the Sullivan company is assured of definite contract and continuous work for the machines, with a revenue dependent upon the management. Naturally the railroad has been eliminated from the proposition, that is, so far as the transportation of the companies between the two cities is concerned.

The example is striking in that it proves what is a possibility with thousands of industries, where transportation can be systematically developed for the benefit of those requiring it, not only affording specialized service, but a large measure of economy that could not be otherwise realized, not only of time and labor, but of freight rates. The Peerless trucks are worked hard, but they are well maintained and are decidedly efficient. They are fitted with special bodies that will permit loads of large bulk. The accompanying illustration shows a truck loaded with bales of wool, this being about as bulky a freight as could be carried on a four-ton machine.

SUE FOR ALLEGED INFRINGEMENT.

The Stewart-Warner Speedometer Corporation, Chicago, Ill., has brought suit in the United States district court against the National Carbon Company, Cleveland, O., for alleged infringement of a Stewart magnetic-type speedometer. This is an amendment to the original bill filed a few months ago against the American Ever Ready Company, New York, N. Y. The Ever Ready Company and the National Carbon Company have consolidated and the Chicago branch, now called the American Ever Ready Works of the National Carbon Company, was the original defendant.

TO PRODUCE ELECTRIC TOOLS.

The International Electric Tool Company has been organized in Milwaukee, Wis., by several men well known in the electrical industry and in engineering fields, to engage in the manufacture of a line of electrical tools for garages, machine shops, foundries, etc. The officers are: W. R. Sorgel, president; W. H. Gaulke, vice president and secretary; E. K. Rundle, treasurer. Factory space has been leased and equipment is being installed.

STUDEBAKER FACTORY EXPANSION.

The Studebaker Corporation, Detroit, Mich., recently acquired the building at Hastings street and the Boulevard, Detroit, which will be used as a service department. This gives more than 100,000 square feet of additional floor space, and means the employment of about 100 more men. When the 1200 feet of new loading docks on Clark and Jefferson streets, Detroit, are erected, the Studebaker Corporation will have facilities for handling 800 freight cars per day.

GENERAL MOTORS BUYS NOTES.

The General Motors Company has purchased for its sinking fund \$2,000,000 of the company's six per cent. first lien five-year gold notes in anticipation of its obligation to pay \$2,000,000 cash October 1 to its trustees for sinking fund purposes. With the cash deposited, a total of \$7,099,000 notes have been purchased, leaving outstanding \$7,901,000 of notes which mature October 1, 1915.

C. I. Campbell, secretary of the Boston Automobile Dealers' Association, has been made manager of the Rockingham fair, which will take place at Salem, N. H., the first week of September.

D. E. Evans, formerly sales manager of the General Motors Truck Company, St. Louis, Mo., is now service manager of the Goodyear Tire & Rubber Company, Detroit, Mich.

MOTOR TRUCKS IN ACTUAL WARFARE.

Surprising Service of Converted Pleasure Cars and Light Vehicles in the Greek Army Operations Against the Turks and the Bulgarians.

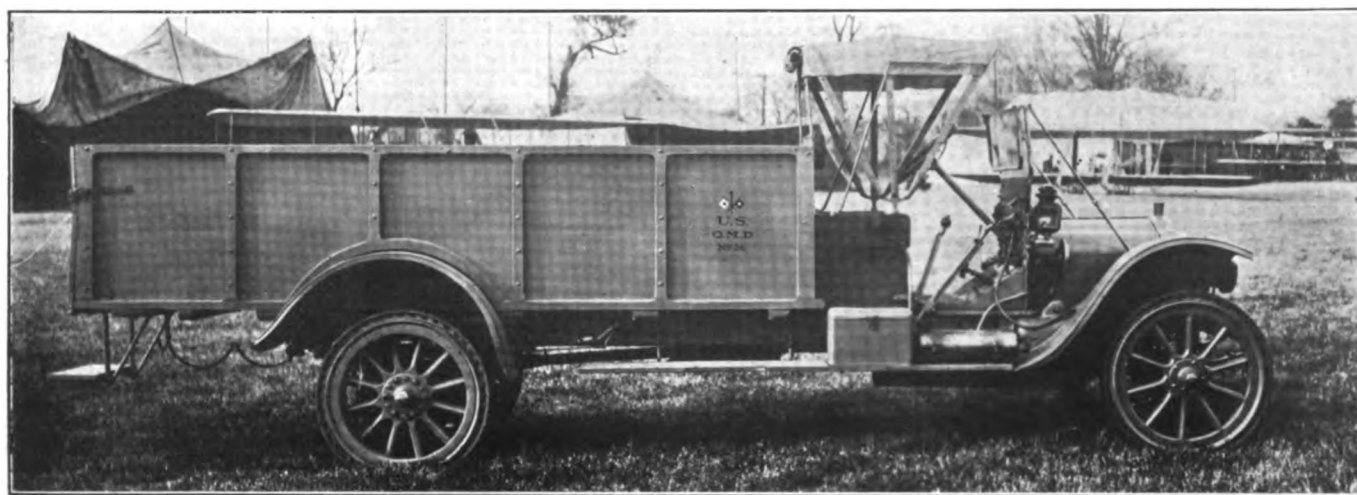
HOSTILITIES between Austria and Servia, which may involve other European nations, have directed the attention of those who have considered the value of motor vehicles for army transportation to the practical possibilities of machines in the military operations that will undoubtedly take place.

Austria is a large empire and it has enormous superiority of resources as compared with Servia. Its army is many times larger and it is no doubt fully prepared for the campaign that has been begun. The Serbs will undoubtedly confine their activities to defense, and this will mean invasion by the Austrians. The railroads of Servia are comparatively small in mileage, and one of the main endeavors by either country will be supplying the forces in the field with supplies and munitions of war.

Speculation as to eventualities will serve no ma-

London daily newspaper during the Greco-Turkish and the Greco-Bulgarian wars, and his observations of the uses made of motor cars and trucks and the equipment that should be provided for the practical utilization of machines, is specially interesting and timely. To Americans this subject is particularly apropos because of the fact that the United States War Department has just begun the purchase of motor wagons and trucks.

Captain Trapmann is convinced that not a little of the success of the Greeks (he was assigned for duty with the Greek army and his observations are largely confined to its campaign) was due to the use of motor vehicles and to the rapidity of transportation between the bases and the forces in the field, while humanity was served, to a degree little understood, by the removal of the sick and wounded to hospitals.



White Truck of 3000 Pounds Capacity with Special Body, Attached to the Aviation School of the United States Army, Conducted by the Quartermaster-General's Department.

terial purpose, but the country in which the Austrians must operate is rugged and mountainous and the roads are seldom sufficiently improved to expect rapid progress by any form of vehicles. The Austrian army must be supported by lines of communication with Austria, and the Servians will no doubt seek to bring supplies through the other Balkan states.

The resources of the Austrians are without question vastly superior to those of the Servians, yet Austria has by no means anything like the number of motor vehicles that has France or Germany. Animals will probably be little used and the armies will depend upon automobiles and motor trucks so far as may be practical.

Trucks in the Greco-Turkish War.

Captain A. H. Trapmann, a thoroughly capable motorist and bicyclist, was war correspondent of a

At the opening of the war with Turkey there were 91 motor vehicles in Greece, and of these 60 were immediately commandeered, with two exceptions, they being private touring cars of from eight to 60 horsepower, in all conditions of use. Most of these were distributed to commanders for general purposes, but the oldest and least serviceable were fitted with bodies and used for freighting. Because of the lack of experience of the drivers, few of whom had mechanical knowledge, and practically none had actual training that qualified them for the work, many of the vehicles were quickly damaged and unfit for service.

Supporting an Army with Trucks.

Following the capture of Salonica the Greek army advanced upon Janina, which is connected with the port of Prevesa by a road 63½ miles length, and immediately the problem was to supply the advancing



Five-Ton White Truck, with Body Constructed for the Transportation of Supplies, in the Quartermaster-General's Department, U. S. A.

force with provisions and ammunition. The army was gradually increased from 15,000 to 60,000 men and it was operating in winter, against a strongly fortified city in a barren country intersected with mountains and generally devoid of roads. The front of the army extended for about 100 miles, there being but one good road from the base to the centre, and from this centre the wings were spread for about 50 miles. To these the supplies were distributed. The trip from Prevesa to the front and return with a team of six mules required about 10 days, and as feed for the animals and men must be carried the useful load that was practical was about 800 pounds outward and five wounded men returning. Evidently an enormous number of animals, wagons and men would be required, and a great deal of time would be lost. This was the condition that caused the Greeks to turn to motor trucks.

The Gain Made by Use of Machines.

First about 30 trucks that could carry an average useful load of about two tons were placed in service. A machine could make the trip from the base to the front in three hours, carrying provisions sufficient for 1000 men for a day, but as a ton of ammunition for each 1000 men was also necessary daily the trucks were worked practically all the time. The road between the base and the front during the winter of 1912-13 was approximately 50 miles length, half of which at first was good, and the remainder ascended 4500 feet in mountain passes, the way often being cut in the sides of declivities. The severe winter storms and the heavy traffic caused the roadway to deteriorate rapidly, but the machines were driven as fast as possible because of the pressing demands for supplies. The inexperience of the drivers was probably the cause of at least half the damage, but the work on the rough road and

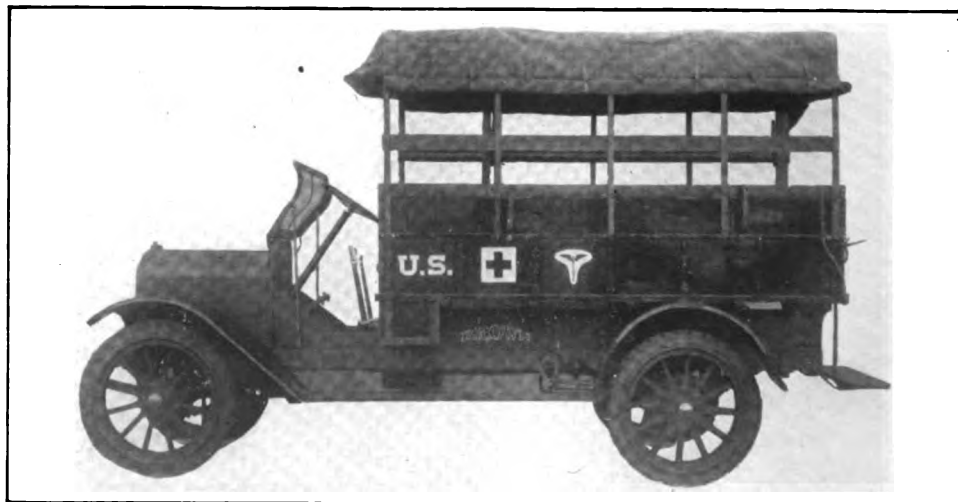
more or less unbroken ground that was traversed with heavy loads was directly the cause of much of the repairing constantly necessary.

In six weeks the fleet of 30 machines was reduced to nine, some of them being ruined by plunges from the road when bridges fell, others by falling over precipices and others from abnormal wear from ignorance or neglect. In this connection one may emphasize that in such service as that of the Greek army there was imperative need of the best of facilities for making every kind of repair, from the adjustment to complete restoration. Absence of such facilities caused the gradual dwindling of the machines and replacement with whatever was available in the nearest market.

Lack of Drivers and Skilled Men.

Many of the drivers were volunteers who had owned cars, but had little mechanical experience. Instead of being experts, skilled in driving and with mechanical training to do whatever work was necessary, they were patriotic and blissfully ignorant. At the base a repair shop of considerable proportions, with equipment that could be moved as desired, would have been ideal, for many repairs made were what might be regarded as emergent and not of a character to endure. The collection of many types and makes of machines precluded the storing of spares and the utilization of these as desired. Instead, many repairs could only be made by making special parts.

But the Greeks did wonders with the machines that they had. With the capture of Janina the army frontage was extended, in some instances to 200 miles from the base, and in addition to the regular troops about 35,000 prisoners were provided with food and supplies. With the advent of the spring of 1913 the road conditions were somewhat improved, but the distances were much increased. The demands upon the drivers were almost beyond the power of men to meet, and instances of men driving continuously for 60 hours were frequent. Besides supplying the army the machines were used to remove the sick and wounded,



Brown Commercial Car, 3000 Pounds Capacity, Utilized by the Hospital Corps of the United States Army for General Service.

this being a result of Capt. Trapmann's personal work that converted a touring car into an ambulance.

Experience in the Greco-Bulgar War.

Following the war with Turkey came the Greco-Bulgar campaign, and in this about 100 trucks were gathered, but even with the experience in the operations against Turkey no attempt was made to secure more experienced or competent drivers or mechanics, and the need of repair facilities was ignored. Besides this many of the gentlemen drivers who had served against Turkey resented the attitude of men of superiority in rank and decided inferiority in every other quality, and the result was a dearth of chauffeurs and men with any practical knowledge of repairing and maintenance. To work as the drivers were required to labor was not attractive to any person, no matter how patriotic or enthusiastic. There was lack of system, supervision and record, and accounting was entirely unthought of.

At the opening of the Bulgarian campaign the Greek army was concentrated at Doyrani, with about two-thirds of the fleet of 100 trucks and later headquarters was established at Hadji Beylik, about 60 miles west. There is a single track railroad between the two places, but communication with this could not be interrupted. The cars and trucks were imperatively needed with the army. They could not be sent over the railroad tracks and the only road was a mule path through brush and all kinds of vegetation. Cutting the brush and other growths would take too much time, and so decision was reached to literally "buck" through this the entire distance.

Making a Military Road by "Bridging."

As might be assumed this operation had the merit of economizing time, but it was destructive of the machines, and one after another they were disabled, some so as to necessitate towing them, but in this manner a road was literally crushed through rather than abandon the machines. In some instances blasting was resorted to and ravines and gullies were filled with the trunks of felled trees, while small rivers were bridged by cob work and corduroy. The character of this extemporized road, to be used but once, can be imagined. But the machines were brought to the army headquarters, and from there operated in Macedonia, where much of the time the drivers drove over rough ground, picking the best way possible.

Even with what are regarded as roads, bridges and culverts were generally destroyed, telegraph wires sagged to the danger of the drivers at night, and with insecure temporary bridges, varying obstructions and possibly mines, the work of the drivers was at all times dangerous. The unusual conditions subjected the machines to stresses far beyond what they were designed to withstand, and accidents were avoided only by extreme care and good judgment.

Ingenious Repairs in the Field.

Necessity forced some remarkably ingenious repairs during this campaign. Many times ordinary cart wheels were substituted for broken front wheels, the

mudguards being removed that they could be utilized. One clever driver extemporized a piston from the heavy brass case of an artillery shell and drove more than 50 miles with it, while another driver with a useless radiator drove his truck a considerable distance with a temporary cooling system devised of water buckets and syphon piping. A detachment with a truck was snowbound in the Albanian mountains for 10 days. The machine was freighted with food, but not one of the four men had matches. They ate raw mutton for two days and then cooked meat in the water in the radiator, suspending it by threads pulled from their clothing; the liquid in the radiator became a thin soup, of which they freely partook.

Requirements in War Equipment.

Some of the suggestions by Capt. Trapmann with reference to the requirements of machines that can be utilized for war purposes are especially worthy of consideration. These include large road clearance, a form of substantial fender that might be used on good roads at night to avoid striking dead or wounded men or animals, a bullet shield to protect the front of the radiator from snipers or stray bullets, stout hooks or rings in the front and rear of the chassis frame for towing purposes, solid tires that can be fitted with chains when necessary, and a shield or guard that will protect the driver and his cab from sagging wires or traps stretched across a road at night. Machines intended for the transportation of wounded should be protected with bullet proof shields about the driver's seat, for serious injury of the driver may mean an unmanageable vehicle, and there is possibility of it being damaged and the sick or wounded injured in the event of being wrecked. Standardization of parts is a great advantage, but is not absolutely necessary. Extemporized repairs may serve for the moment, but good service means restoration as quickly as is practical, and provision should be made for a field repair shop, which should have a sufficient corps of expert mechanics.

ELECTRIC VEHICLE DAY?

In order to give the public some idea of the extent to which electrical vehicles are used, it has been proposed that some day, preferably a holiday, be appointed as an electrical vehicle day when, in the various centres throughout the country, there shall be a parade of electrically equipped vehicles, and prizes offered for the best decorated commercial and pleasure vehicles.

It is reported that the Long Island Railroad will probably issue an order to its watchmen and gate-men that crossing gates be kept closed constantly, and raised only to allow automobiles and other vehicles to pass. This custom prevails in certain portions of France and England, and has proved a great aid in safeguarding the public.

ELDRIDGE FRONT DRIVE TILTING TRACTOR.

CONVERSION of horse drawn vehicles to electric motor driven has been specialized for several years by the Eldridge Manufacturing Company, Boston, Mass., and several forms of tractors have been devised by W. E. Eldridge, president and manager of the concern. He has now supplemented this by the production of the Eldridge front drive tilting tractor, and patents have been applied for covering this machine. According to what the records of the patent office at Washington show of the present state of the art, the form of construction is entirely new, and there is every reason to believe that basic patents will be granted.

The company is agent for New England for the well known Couple-Gear trucks and tractors, both battery and gasoline-electric, and the Eldridge front drive tractor is a chassis with two Couple-Gear wheels driven by a battery. Eldridge tractors are in service in a considerable number of cities and towns, they being especially adapted for slow, heavy haulage. Usually these tractors are used with a body permanently attached, for the tractors cannot be driven unless coupled to a set of rear wheels, and though changes from one trailer body to another can be made in comparatively short time a single form of equipment is intended for these vehicles.

Four-wheel tractors, which can be used with a number of different trailers, and which can be driven independently, are built. A single-wheel tractor, that is built for service with a two-wheel trailer, with capacity of about $2\frac{1}{2}$ tons, is also constructed by this firm. The single-wheel tractor is intended to take the place of a single horse. The two-wheel tractors replace a team of two horses, and the four-wheel tractors three, four or more animals.

The tilting tractor, so-called, differs from the one

and two-wheel types in that it is quickly detachable and may be utilized with practically any form of horse drawn vehicle. The first of these machines was built for the Curtis & Pope Lumber Company, a concern that already had in service two of the four-wheel tractors. The company is rated as the largest retail lumber dealer in New England. For years the company used horses and it has a large number of wagons that represent material value, which the officials desire to use and escape the sacrifice that would be necessary were these offered for sale. Not only this, the conditions of loading and delivery are such that trailers must be used to realize a satisfactory degree of economy.

Tilting Tractor a Utility Vehicle.

To meet the requirements of this and similar enterprises Mr. Eldridge built the tilting tractor, which has a quality of mobility when detached, so that it is, for service purposes, an entirely operative unit. By this is meant that the machine can be utilized as are the four-wheel tractors, but of course must be coupled with a trailer when the distances to be driven are considerable.

The tractor itself is mounted on a pair of Couple-Gear wheels, each wheel containing an electric motor, that is driven by current supplied from a storage battery. These motors drive at a single 25:1 reduction in balanced action at the inner peripheries of the wheels, the armature shafts carrying pinions at the ends that mesh with racks in the edges of the plates forming the wheels. In the drive, the method of supplying the current, and the means of control, the machine follows practically the Couple-Gear practise, but the invention is the construction that affords quick attaching or detaching and the mobility of the tractor when detached from the trailers.

An examination of the drawing showing the side elevation of the tractor and trailer wagon attached, and the illustration of the tractor detached from the trailer, will show the features of construction. As may be noted, the chassis is balanced on the axle with a sufficient excess of the weight back of the axle to insure against it tipping forward. The rear end of the chassis is supported, when detached, by a pair of auxiliary wheels.

Referring to the drawing, one will learn that the position of the auxiliary wheels when the tractor and chassis are be-



The Eldridge Tilting Tractor, Capacity Three Tons, with Maximum Daily Mileage of 50, Shown Without Trailer.

ing operated is clear of the ground, and that the chassis frame is then approximately horizontal, but in the illustration the frame is shown slightly inclined from front to rear, this variance explaining the name given the machine. Examining the drawing one will note that the tractor chassis frame extends well back of the battery box, the length being approximately five feet. Directly back of the battery box is a vertical strut. Forward of this is a very large hanger which carries the rear end of the spring, while at the lower end is attached a vertical member that parallels the chassis frame. From this lower horizontal frame member a diagonal extends to the spring hanger, the construction being intended to thoroughly brace the lower frame member. These lower frame members are connected by a substantial cross member. Each lower side member carries a small full elliptic spring, and mounted on these is the axle and the two auxiliary wheels. The axle is of comparatively heavy construction.

Auxiliary Wheel Frame.

The frame carrying the auxiliary wheels is strongly built of steel channel section and it is intended to endure hard service, but it will not be worked with a varying load. The wheels are artillery type and shod with solid rubber tires, but revolve freely on the axle, having a tread narrower than the driving wheels. The ends of the side members of the chassis frame extend beyond the rear cross member, and these ends are cut diagonally from top to bottom and from the rear forward. The chassis is carried forward of the dead front axle, and at the end is installed the seat for the driver. The seat is installed directly on the frame and the footboard and the rise of the seat and the dash are carried by a heavy angle steel frame that is supported at either side by a curved side member, the upper ends of which extend above the frame side members. These supports are riveted to the frame, the spring hanger and the footboard frame, at the rear and beneath the dash. The curved members, extending below the axle, serve as skids and will support the chassis in the event that weight or momentum causes it to tip forward. Two lamps are inserted in the dash. The upright steering column is anchored to the footboard, and beside it is the brake pedal, the brake operating on the forward wheels only.

The upper end of the side member supporting the footboard secures the forward side of the battery box. This box is built with removable sides and cover. As located, the greater weight of the battery is carried back to the tractor axle. The driver's seat is covered with a folding top.

To use this tractor a wagon is adapted by removing the front axle and wheels, the perch and bolster and the upper half of the "fifth wheel" being re-

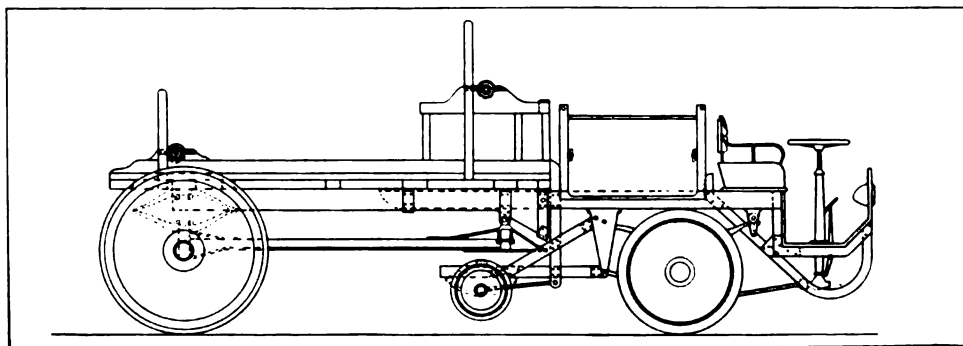
tained, but the springs are removed. At either side of the forward ends of the sills of the trailer platform are placed what are known as pockets, these being of heavy steel, with the outer sides and the bottoms having a considerable degree of flare for a short distance. The outside width of the tractor chassis frame is approximately the same as the inside width of the trailer frame.

The trailer is intended for use with horses while loading is done, all that is necessary to make the change being the front axle and wheels, the axle carrying the lower half of the "fifth wheel." The expectation is to use from three to six trailers with each tractor, according to the length of the trips. At the front and rear of the trailer body are rollers, that at the forward end being elevated approximately 25 degrees. On these the loads are stacked and bound at whatever part of the yard may be convenient and drawn by horses to a location where they can be quickly reached with the tractor. There the forward ends are raised by jacks and supported by horses, the king bolts removed and the front axles and wheels drawn away and used for loading other trailers.

The trailers are loaded in the yard and left in readiness for the tractor, any wait or delay there involving no expense or loss. At the destinations the loads are unbound and allowed to slide off until the rear end strikes the ground, and then the tractor can draw the trailer from beneath the forward end. Loads can be discharged in bulk in this manner with rapidity, and the trailers returned to the yard.

Tractors Are Separate Units.

The tractors are separate units and are kept in garages as is any other motor vehicle. Moved from yard to garage, or about the yard, they are used independently. But for haulage they are coupled by backing the rear of the tractor frames into the heavy metal pockets at the forward ends of the trailer frames. The chassis frame is guided by the metal pockets, the flare at the bottom lifting the tractor rear end, and the side flare insuring quick and certain engagement. When the tractor is backed so that the frame is at its full length between the frame of the trailer, the coupling is completed by engaging two hooks, one at either side, and tightening turnbuckles in two rods. The auxiliary wheels then have a road clearance of fully six inches. To uncouple trailer



Side Elevation of the Two-Wheel Driven Eldridge Tilting Tractor, Showing the General Plan of Construction.

the turnbuckles are loosened, the hooks cast off and the tractor started ahead until it is drawn free of the trailer, when the rear end of the tractor will drop until it is supported by the auxiliary wheels. At such times a wooden horse is used to support the front end of the trailer.

The position of the battery is such that it may be readily removed as a unit by an overhead chain hoist. In the use for which the first tractor was built the time required for loading and unloading is small, so that the machines may be kept moving practically all of the time. Two batteries are provided for each tractor, that a change may be made each working day at noon. The normal tractor speed is six to eight miles an hour with a load of three tons, but with a five-ton load the speed will be reduced to from five to seven miles an hour. With two batteries a daily mileage of 50 is practical. The statement is made that almost any type of horse wagon can be equipped with the frame pockets and adapted for use with this type of tractor.

OHIO'S BIG ROAD CONTRACTS.

Contracts covering more than 50 miles of Ohio roads to be improved have been awarded by State Highway Commissioner Marker to bidders whose total figures for the work amounted to \$793,974. No bids were received for 10 of the roads advertised that had a mileage of 13.93 miles and an estimated construction value of \$121,185. Apparently the road improvement of Ohio has developed so rapidly that the firms now doing this work in the state have not been able to undertake all of the contracts for which appropriations are available.

GOODYEAR STOCK GAINS VALUE.

During July the price of Goodyear Tire & Rubber Company stock reached 184 bid and 186 asked, a gain of 18 points. The rise was due to favorable reports of the business transacted the first six months of the current year, which is stated to be 38 per cent. more than for the corresponding period of 1913.

The Cadillac agency in Boston has been reorganized and a new company incorporated for \$100,000 with A. L. Danforth as president; J. James McGregor, treasurer, and B. K. Danforth, secretary. President Danforth took charge of the company following the retirement of Alfred Measure.

The Detroit Tractor Company has been incorporated in Lafayette, Ind., with a capital of \$100,000, to manufacture machinery and tractors. The incorporators are: George F. Baker, Frank E. Baker, Cecil G. Fowler and others.

MOTOR AGRICULTURAL MACHINERY.

American agricultural methods have proven the economy, and forced the production of a very large part of the improved machine implements that are used throughout the world. These machines are largely abroad, but, strangely enough, the utilization of motors for such tools has been practically neglected in this country, while foreign nations have very systematically promoted their use and stimulated invention and production. There is quite as much promise for motorized agricultural machines as for other types, and if America is to continue to maintain its supremacy there is every reason why competitions and trials, such as the European countries are promoting, should be organized in the United States.

MOTH BALL MOTOR FUEL.

A substitute for gasoline is being experimented in Indianapolis, Ind., by John Andrews of McKeesport, Penn. Mr. Andrews, by using moth balls and water, together with a secret powder, distilled a fluid which he claims was equal to gasoline, and said it could be made for two cents per gallon. A 3800-pound car ran 12½ miles on one gallon of the fluid, and later ran 17½ miles on one gallon, showing a flexibility between three and 61 miles per hour on high gear. Another car was driven 200 miles on the new fuel, and it was stated that the valves of its engines showed no appreciable carbonization.

STEWART-WARNER EARNINGS.

The net earnings of the Stewart-Warner Speedometer Company for the quarter ended June 30 last, exceeded \$400,000 on the common stock, and for the six months ended June 30, the net earnings applicable to dividends approximated \$600,000. This is equivalent to the full year's seven per cent. on the preferred stock, and six per cent. for six months on the common.

The Kissel Motor Car Company, Hartford, Wis., is completing a three-ton chassis with carryall body for Charles Courtney of Hartford, Wis., who will attempt one of the longest journeys ever made in a motor truck. Mr. Courtney plans to start immediately on a 3000-mile tour, winding up at the Panama-Pacific Exposition in San Francisco in time for its opening in February, 1915.

George H. Duck, president of the Motor Truck Club of America, who has been prominent in the motor truck industry for several years, has been appointed manager of the Sewell Cushion Wheel Company, New York, N. Y., with offices in the United States Rubber building.

WHAT CONSTITUTES "SERVICE".

Responsibilities of the Industry to the Owners of Vehicles Expressed to the Motor Truck Club from the Viewpoints of Manufacturer and Agent.

WHAT constitutes "service" was the subject of discussion by the members of the Motor Truck Club of America at the meeting in New York City, July 15, and the purpose was to obtain from representative interests of the motor vehicle industry a definition of the word as applied in the sale of machines.

Because of the longer experience with pleasure cars, and the results from competition of manufacturers of these machines, the builders of wagons and trucks have inherited an assumption by the people that has become an extremely perplexing problem. The public generally has at least the impression that "service" means continuous maintenance, and that each purchaser is insured constant attention, despite provisions of guarantees, warranties or the conditions of contract.

At this meeting four papers were presented, one of which was by D. O. Skinner, advertising manager of the International Motor Company, which was descriptive of the service system the vogue at the service station of the company at West End avenue and 63rd and 64th streets, New York City. The statement was made that this station was a separate and distinct branch of the business, which was conducted by the executive department, and was not in any way related to the sales division.

W. L. Day, general manager of the General Motors Truck Company, presented a paper on the subject of service from the manufacturer's standpoint, and J. W. Perry, New York manager of the Lippard-Stewart agency, handled the same subject from the viewpoint of the dealer. Mr. Day's paper was read by C. B. Warren, manager of the New York City branch of the General Motors Company, and Mr. Perry's was read by D. C. Fenner.

President G. H. Duck began the discussion by pleading for the standardization of service as one of the most important of the tasks now before the motor truck industry. He deplored the lethargy of the majority of those interested in the development of the business and urged that manufacturers and dealers and even owners get together and discuss the question with a view of definite action.

One of the papers read did not divulge the name of the author, who suggested in brief that the solution of the service problem lay in reducing the initial cost of the vehicle to purchasers, by the amount which the manufacturer might expect to outlay for subsequent service.

W. L. Day, general manager of the General Motors Truck Company, spoke in his paper on the neces-

sity for service as viewed by the manufacturer. He said in part:

From the Manufacturers' Viewpoint.

"We are all agreed, no doubt, that no business enterprise depending on the public for support can long exist without service. We are also, no doubt, agreed that in the motor truck field the buyers of trucks have been led to expect too much 'free service.'

"We all know, whether willing to admit it or not, that the word 'service' in connection with the sale of motor trucks has been very much abused. In our desire to keep all of the other 200 competitors out of the field we all tried to make good the foolish promises of our salesmen, and the watchword seemed to be 'get the business—hang the profits.' Such extravagant practises have made the motor truck business unprofitable, in spite of the fact that the public has insisted that the motor trucks cost too much money.

"The selling of motor trucks is a merchandising problem not unlike the selling of any other equipment. If this be true, why shouldn't they be sold on the same basis and the same kind of service be furnished the customer? We demand good service from whomever we buy anything, but we all know that although we may get the service, we are paying for it, unless, perchance, we buy a motor truck and then we expect the factory and the sales force to give us their services gratis.

"A good motor truck adapted to the service for which it is bought will make money for its owner if properly handled. In the selling of motor trucks the first service to a prospective customer should be a pre-sale service. The customer's transportation problem should be thoroughly and competently analyzed. It should be determined whether the prospect can use trucks advantageously in his business. If he can, he should be advised as to the kind and size best adapted to his service. The salesman whose desire for an order leads him to persuade the customer to make a wrong installation, to buy an electric when a gasoline truck would serve him better, or to buy two one-ton trucks when one two-ton truck would do his work, not only injures the business of his own company, but damages the truck business in general.

"It is the duty of the manufacturer to make provision for prompt service in the way of repair parts, to provide the customer with an illustrated parts list, so parts can be ordered intelligently; but if a part is broken through the carelessness or recklessness of the driver, while the customer should be able to get the repairs promptly, he should pay the expenses of making the repairs.

"There are, of course, numerous ways in which the factory representative or the dealer can be of service to the purchaser. That somewhat intangible or indefinite service, but nevertheless valuable co-operation with the owner; the offering of suggestions and advice that will assist the owner to get the best and most profitable service out of his truck. We do not believe that in any line of business in which the public is served a hard and fast rule can be laid down as to just what 'service' should be given and what withheld, excepting that we do not believe it is wrong to lead a purchaser of a truck to believe that he will virtually be relieved of all responsibility of maintaining his truck, and that is what too many of us were guilty of doing in the earlier days of the truck. The man who buys an outfit of horses and wagons for his haulage service expects to assume all responsibility in connection with the use of the same.

"There may be a temporary advertising value in promising a customer what virtually amounts to a perpetual chaperoning of his truck, with a skilled mechanic at call, day and night, or an extra service truck to be had on demand in case of a breakdown, but it can be only temporary, for such promises cannot be lived up to if much business is secured, and here also the reaction is detrimental not only to the individual manufacturer, but to the entire trade. The more the purchaser of a truck assumes the responsibility of its care, the better satisfaction he will get out of his purchase and the better 'booster' he will be for the manufacturer whose truck he uses and for the use of trucks in general."

From the Dealer's Viewpoint.

J. W. Perry, manager of the New York branch of the Lippard-Stewart Company, in his paper, dwelt on the subject of service from the dealer's viewpoint. Mr. Perry said in part:

"This much mooted question has been the cause of much ill feeling between dealer and manufacturer, and dealer and customer. Much of it has arisen from the dealer's desire to effect a sale, and in this endeavor he is at times prone to offer too much to the customer, especially to a first purchaser, or a man who has never used a motor truck.

"After a hard siege and meeting the usual fair and unfair competition, all of which have placed the prospect in a frame of mind where he himself scarcely knows what he wants, the dealer sometimes, in his enthusiasm, promises more than he should, hoping that he may never be called upon to 'make good,' or, if he should be called upon, to placate or 'stall' the purchaser with some plausible story. It happens, however, that some purchasers are wise enough to have a very thorough understanding with the dealer before signing his contract, and in that event the dealer must make good, and here is where he falls back on the factory for help. In such cases the dealer is not entitled to help and should be left to reap the reward of his own indiscretion.

"To remedy or prevent any such conditions arising,

there should be a very thorough understanding between buyer and seller as to what he is entitled to and what he may expect, and this understanding incorporated in his purchase contract as far as possible. Experience shows that each car sold requires a certain amount of supervision and tuning-up for the first few months or year, which is generally furnished in the interests of the industry and the particular car just sold. There is a danger of sinning on the wrong side and giving too much supervision, which eventually leads the customer to think that the car is not as good as it should be, or leaves him under the impression that the dealer will make good anything that goes wrong, whether such wrong is due to faulty construction or to careless handling.

"Under any conditions the purchaser is entitled to prompt service, and this should be given him and he should be made to pay for any damage due to his negligence or misuse. There are times, however, when matters come up for adjustment where claim is quite debatable. A superficial examination of the complaints of users leads us to the source of most of the trouble, and this is caused by the manufacturer himself. He, the manufacturer, in his endeavor to place agencies and incidentally securing orders for demonstrators from such agents, is likely to look up the financial standing of such agent rather than his integrity. He figures that every agent secured means two or three cars sold, and a volume of business seems more important to some of them than the selection of able and competent representation. Under these conditions we find many agencies who, in their endeavor to make sales, by any or all means, will promise more than they should. The manufacturer sits back and smiles—for the more sales are made the better for him, as he sells to the agent for cash and ships against bill of lading.

"Members of the Board of Trade give a 90-day guarantee only, whereas the agency must give one year, if he is to meet competition. When the 90 days expire and claim is afterward made, the manufacturer calmly points to his guarantee and says, 'Nothing doing.' The agent must necessarily make good to his client, and in this way large inroads are made in his profits. The remedy should be that a manufacturer should just seek for agents men who understand the motor truck business and who are known to be fair and honest first, and financially capable next. When such an agency has been placed, the manufacturer should back him up to the limit, otherwise the reputation of his product will suffer in the end.

"My contention is a defective part should be furnished free of charge and labor of putting the same in place should also be free to the customer. Now comes the interesting question of who is going to pay for all this? The manufacturer, unquestionably. If he makes all his parts in his own factory, the return of the defective part to him is of value inasmuch as it shows him wherein he is at fault and enables him to remedy the evil in his future production. If the de-

fect is in the material, he has recourse on the producer of the raw material. On the other hand, if the so-called manufacturer is an 'assembler' only, he loses nothing and recovers fully from the house furnishing the parts. So that the loss in full replacement of parts is frequently an asset in assisting the manufacturer to determine where parts are weak, and such discovery is not always possible in the usual factory pre-sale road test.

"The labor of putting such parts in place for the user should also be charged to the manufacturer. The agency does not build the truck, nor are they supposed to be mechanics, although most of them maintain a repair shop. They sell the truck as agents and indorse the guarantee of the manufacturer. The purchaser knows the agent only; in many cases does not even know where the truck is built. The purchaser then holds the agent responsible and he must make good. Attention to the customer as outlined above constitutes, in my mind, 'good service'; anything short of this is not service. The agent's duty is to sell trucks and see that they give satisfaction, and this he can only do with the co-operation of the factory. The more trucks he sells, with good service, the more the reputation of the particular make will be advanced. This is important to the manufacturer, for if he changes his agency the successor may inherit the evil reputation created by his predecessor.

"To sum up, I still maintain that if manufacturers used more discrimination in their selection of agencies and when they had found the right one to back his judgment, there would be more sales made and a better feeling created between all concerned. As matters now exist there must be a 'goat,' and he is the agent."

TO IMPORT LONGUEMARE CARBURETORS.

Following the litigation between the Stromberg Motor Devices Company and the Longuemare Carburetor Company in New York the Longuemare Company is preparing to push the importation and sale of its foreign-made carburetors. A preliminary injunction issued by Judge Hand affects only the making of carburetors in America. The Longuemare Company is permitted to import and sell under a \$10,000 bond.

The Standard Oil Company has reduced the price of gasoline in New York to 13 cents a gallon, a reduction of one cent, for tank deliveries to garages, and 17 cents in barrels to consumers. These prices are four cents a gallon lower than for the corresponding period of last year.

The Mill, ⁵/₈ Rubber Company, Akron, O., is placing \$400,000 of its preferred stock for sale in the western market.

DETROIT'S EXPORT BUSINESS.

Gain in Pleasure Cars, but Loss in Trucks, in First Half of 1914.

Out of a total of 4207 pleasure and commercial cars exported from the State of Michigan for the first six months of 1914, 3324, or 79 per cent., were manufactured by concerns located in Detroit. The value of the cars exported by Michigan manufacturers is \$3,942,423, of which \$3,184,875 is to the credit of Detroit. Including parts and accessories, the total export for the state was \$5,819,489, of which \$4,752,268 is credited to Detroit manufacturers.

For the first six months of 1914, Detroit manufacturers exported 3205 passenger cars valued at \$3,030,251, an average of \$945 per car. During the same period of 1913 a total of 2149 passenger cars were exported, valued at \$2,542,937, an average of \$1183 per car. The increase in passenger car exports is 49.1 per cent.

The number of commercial cars exported for the first half of this year was 119, having a value of \$124,624, an average of \$1047 per vehicle, while during the first half of last year 177 trucks having a value of 165,209 were exported, their average being \$933. This shows a decrease of 32.8 per cent. in the number of machines exported and a decrease of 24.5 per cent. in the total value.

Parts and accessories of a total value of \$1,597,393, as against \$1,404,082 for the first half of 1913, have been exported, representing an increase of 13 per cent.

SUIT FOR \$100,000 FOR ALCO SALE.

The Park Square Auto Company, Boston, Mass., has brought suit for \$100,000 against the American Locomotive Company, Manchester, N. H., alleging breach of contract. The Park Square Company maintains that the American Locomotive Company gave it the exclusive agency for Alco cars and trucks for Boston and four counties, and despite this selling agreement sold 125 taxicabs in that territory without the knowledge of the plaintiff, thereby violating the contract. To receive the commissions claimed to be due from the sale of these automobiles the suit is brought.

L. B. Thomas, W. W. Letts and G. B. Letts have incorporated the Thomas Carbon Remover Company, at Cortland, N. Y., with capital of \$10,000, and will engage in the manufacture of a carbon remover for gas engine use.

President Samuel P. Colt of the United States Rubber Company predicts still lower prices for crude rubber.

BIDDING FOR TRUCK MAIL HAULAGE.

PROPOSALS for carrying mail between New Haven and Waterbury, Connecticut, two of the most prosperous cities of that state, by motor truck, will shortly be received by the Post Office Department, and decision reached on the basis of the bids submitted, which is expected to satisfactorily determine a decidedly unusual situation. The instance is believed to be the first of this nature that the government has had to deal with.

The Connecticut Company, which controls the greater part of the electric railroads of the state, and is a subsidiary of the New Haven railroad, for years had contract to transport mail between different towns and cities in Connecticut, making bids extremely low that it might practically be certain of obtaining contracts, the revenue being a very desirable addition to its earnings. As the company must operate its lines with regularity the transportation of the mail involved no additional expense and was regarded as a "pick-up" that was worth continuing as long as possible.

But when the New Haven road began to minimize its expense and economize from every angle the Connecticut Company regarded the mail haulage in a different light. More money was necessary for the service or the company would abrogate its contract. The government, as with all mail contractors, expected the service to be continued to the expiration of the contract term, but June 22 the company "struck." The postal department looked to the postmasters of the offices affected to make temporary arrangements pending inquiry and determination. In some instances motor vehicles were hired and operated as necessary, this emergent service being, of course, without reference to expense, the sole purpose of the postal department being to continue the transportation with the least delay that was practical.

No Mail 12 Hours Each Day.

Since June 22 mail has not been taken into or out of the city between 6:30 in the evening and the same hour in the morning. Naturally this aroused the business men of Waterbury, who took the matter up with Postmaster Troup at New Haven, who in turn consulted with Congressman Kennedy to bring about a relief. Measures are being expedited as much as possible, that business men of the Naugatuck valley can send out letters in the evening. Not only this, but the discontinuance of evening trains has materially affected Ansonia and adjacent towns and cities.

Such a situation may be precipitated at any time. The contracts call for the transportation of mail at a fixed price a mile and specified times are for departure and delivery. Means must be available for handling any volume. The claim is made that for intercity mail haulage motor trucks are decidedly superior to railroads, from the fact that the freights can be deliv-

ered at and taken from the post offices, and collections can be conveniently made in the same manner en route.

Two Propositions for Relief.

In the present instance bids for automobile truck service are to be asked for the carrying of late local mail to leave Waterbury at 11 p. m., arriving at New Haven at 1 a. m. The return trip is to be made from New Haven at 3 a. m., arriving in Waterbury at 4:30 a. m.

The above is the second plan submitted for the carrying of mail by motor trucks. The first was to carry the mail from New Haven at 9 o'clock at night and make stops at Ansonia, Derby and Naugatuck, arriving at Waterbury at midnight. The return trip would carry a mail from Waterbury a little after midnight, going by way of Cheshire, and taking the late pouches from Waterbury, arriving at New Haven at 3 a. m. This would be a favorable means of relieving Waterbury of its present difficulty, and bids for the above plan have been made. The lowest bid was \$10 a day.

Postmaster Troup of New Haven has sent the plans of the two propositions to Congressman Kennedy and as soon as bids are received on the second plan a decision will be made. It is necessary for the congressman to get permission from the postmaster-general to change the method of carrying the mail from train and trolley to motor truck.

Trolley Company Hedging.

Meantime the Waterbury Chamber of Commerce is endeavoring to induce the Connecticut Company to reconsider its decision and carry mail pouches to and from New Haven. William J. Pape, editor of the Waterbury Republican, appointed a committee of one by the Chamber of Commerce, held a conference with Postmaster Troup of New Haven, and G. Y. Gaillard, general manager of the Connecticut Company. Mr. Pape likewise had a conference with Fourth Assistant Postmaster-General Stewart at Washington, and was informed that the Connecticut Company could receive separate contracts for carrying mail over different routes without being compelled to carry it over others. Under this plan a separate contract could be made covering New Haven and Waterbury. Mr. Pape then suggested to General Manager Gaillard that his company carry mail out of Waterbury at 11:30 p. m. to New Haven, and transport mail from New Haven to Waterbury at 11 o'clock at night. For this service the company would receive \$525 annually from the government, but the offer was turned down. However, the Connecticut Company's manager said that he had not known that mail could be handled over certain sections and refused in others, and that if bids could be made this way the road would be willing to consider a proposition.

ELECTRIC VEHICLE PRACTISE.

Forms of Equipment to Be Used for Charging with High Voltage Direct, and with Alternating Current, These Including Types of Motor Generator Sets and Mercury Arc Rectifiers---Some Qualities of These Machines.

By William W. Scott.

CHOICE of battery charging apparatus must necessarily be made with reference to numerous conditions, and statements previously made have dealt entirely with direct current available, so that the energy may be utilized by the installation of charging panels and rheostats. When the current is alternating this must be converted to direct, a condition that requires different apparatus. These include mercury arc rectifiers, rotary converters, motor generator sets and mechanical or synchronous rectifiers.

There are those who may assume the generation of current by a consumer is economical, which might be practical by a steam, oil or gasoline engine, or by a gas producer plant, but instances where energy can be produced as cheaply as by a central station are not numerous, and are decidedly the exception. Not only that, there is the factor of reliability, which is of material importance. Eliminating this aspect and assuming current can be supplied, the apparatus necessary may be one of those mentioned.

What is probably the most simple is the motor generator set, in which an alternating current motor drives a generator that produces a direct current. But one recommendation can be made with reference to this character of installation, and that is that the equipment be selected that is well constructed, will have high efficiency and will endure for a long period, the better satisfaction and lessened repair more than offsetting the difference in the initial cost.

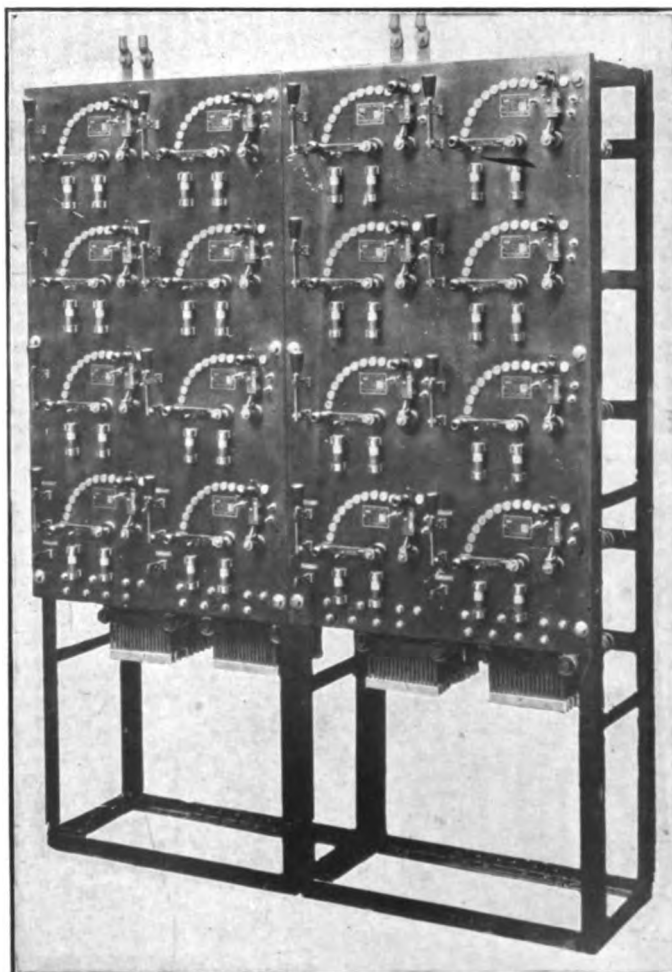
A rotary converter with a regulating transformer, or preferably with an induction regulator in the primary circuit of each rotary will make a very efficient equipment for very large garages, where at least 75 per cent. of the full load can be used at one time while the set is running, so that its greatest economy can be realized.

A useful purpose may be served by emphasizing that one cannot practically discuss differing conditions with reference to the apparatus that might be the most economical, with a view of advising the reader of what would best meet the requirements of any stated condition. Neither can one deal with a suppositional instance without considering every detail that may enter into it. For these reasons the discussion has been limited to principles that may be usefully applied, but no attention is given to design of equipment or to construction, care or maintenance

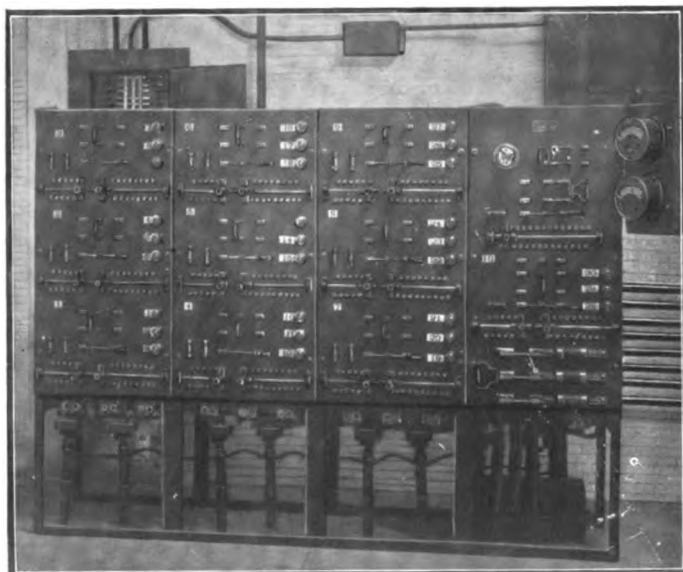
for these do not logically enter into electric vehicle operation. To review the subjects referred to would be consideration of detail of electrical engineering far beyond the scope and purpose of these articles.

A desirable construction with every garage equipment is that it should be so selected that it may be added to as occasion requires and maintained uniform. No good reason can be given why there should be variance in make or model of charging facilities, and many reasons can be stated why they should be alike throughout. The determination should be based on permanence and probability of expansion, and the economy that may be obtained in current consumption.

In this connection the equipment that may be used



A Form of Charging Switchboard in Which Each Panel Is Connected with Eight Rheostats.



Conventional Type of Multiple Battery Charging Switchboard, Installed in a Public Garage.

with alternating current should be chosen with care because the cost of energy needs be minimized, and yet the capacity of the installation ought to be such that it will be sufficient for whatever demands may be made upon it. In general practise the central stations generate alternating current, so that a majority of those who will garage or charge electric vehicles will require apparatus which will convert the electrical energy so that it may be utilized for charging.

The motor generator set is one practical installation, and means of rectification of the current is the other. Considering these as both adaptable, the economy is the principal factor, and this brings up the character of service. If the motor generator can be utilized to three-quarters or more of its capacity while running it may be said that the demands of the service are satisfactorily met, but if the requirements are exceedingly variable then rectification is the more economical, for the mer-

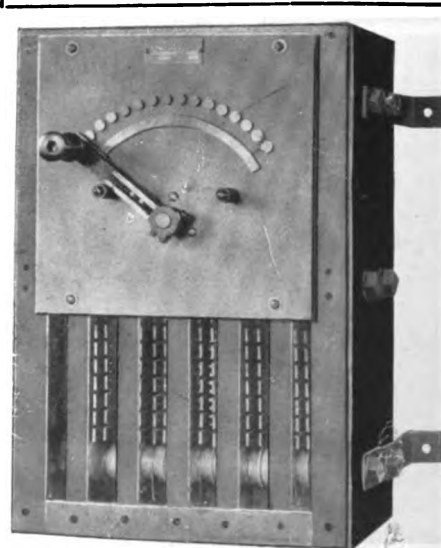
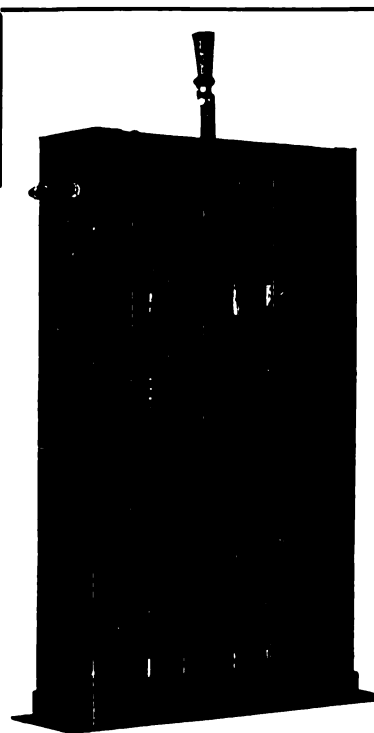
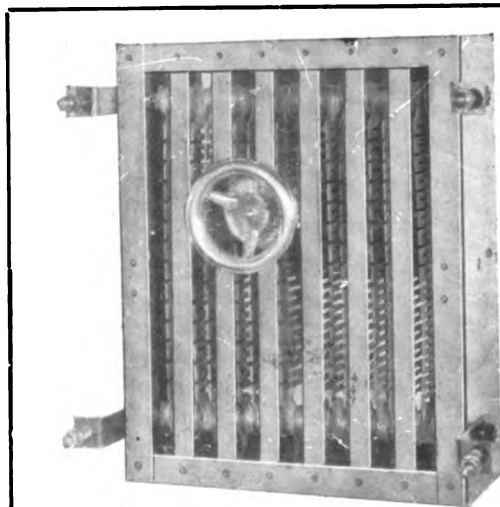
cury arc rectifier can be used as efficiently with a half load as when operated to its capacity. Of course much depends upon the types of batteries to be charged. If the vehicles are uniform in size a standard of voltage and amperage is desirable, but if there is a considerable range this will entail a variance of current that will necessitate rectifying.

There is not commercially available a mechanical form of rectifier that can be regarded as sufficiently reliable to justify its use, and while there is no doubt a demand for such apparatus, and eventually it will be developed and perfected, one cannot regard this type as practical.

Where the current is direct and from 220 to 250 volts, a motor generator for a small garage is to be preferred to a large rheostat, because of the current loss that would result from the use of the latter. This condition is, however, so rare that it is merely desirable to refer to it in passing. If current is direct and of from 500 to 600 volts a motor generator that can be used to its full load capacity is the most practical. In either event the motor of the generator set should be designed for the full line voltage and the generator designed to deliver such voltage as can be used.

With alternating current supply and variable demands a combination equipment may be installed that will include a motor generator set and mercury arc rectifiers, so that any extreme condition may be dealt with economically. The motor generator sets are built to different sizes and one can obtain a single unit that will probably meet all requirements, although in large garages, where the demands are variable, two sets are sometimes installed, the larger for the regular charging of a number of batteries and the smaller for use where there would be unnecessary

consumption of current with the large machine. With relation to the choice of motor generators the essential is that endurance and reliability be considered. There is, of course, some loss



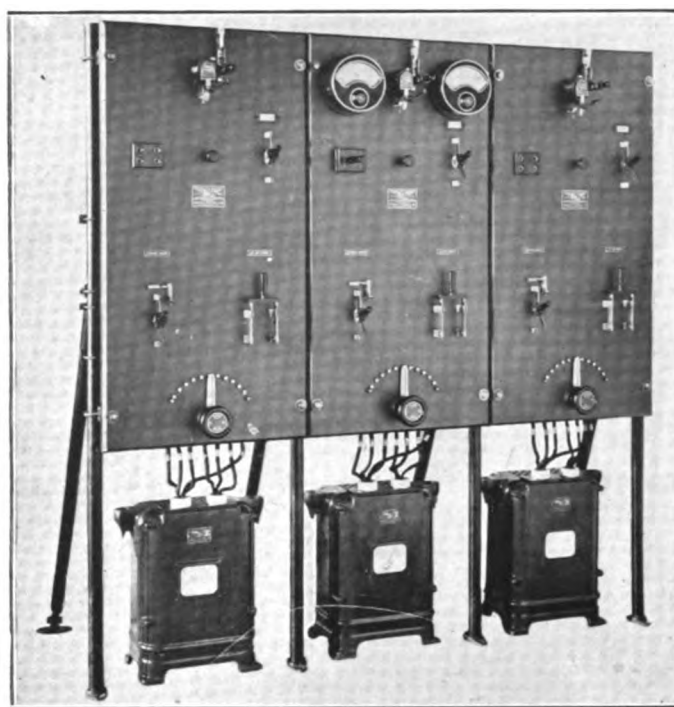
From Left to Right: Charging Rheostat for Mounting at Rear of Switchboard; Rheostat Designed for Floor Mounting; Rheostat for Mounting on Wall or in Front of the Switchboard.

in the transformation of energy, but this is not to be compared with the waste through rheostats. With a double set the current loss is minimized. Yet the fact must always be considered that unless a motor generator can be operated to 75 per cent. of the load designed for it the efficiency is not the best.

Motor generators designed for battery charging are built in two types, the direct current motor that drives a direct current generator, and a direct current motor driven by an alternating current motor. The first mentioned types are generally constructed with 125-volt shunt wound generators driven by 230 or 550-volt motors, ranging in capacity from an eighth to 13 kilowatts, the speed being gradually reduced as the machines increase in size. These are enclosed in steel frames and constitute single units. The alternating current motor generator sets consist of 125 shunt wound generators with 110 or 220 single-phase motors, or 110, 220, 440 or 550 two or three-phase motors. With these the speed is practically the same for all the sizes. These are also enclosed in steel frames and are assembled as units.

Motor generator sets of larger size may be obtained, the general allowance being from $2\frac{1}{2}$ to three kilowatts for each of the lead batteries to be charged at a time. Thus one will assume that where a considerable number of batteries are to be charged the capacity of the set must be based on multiples of the allowance for batteries, and the equipment must be selected on the charging that will be necessary, making provision for as many batteries on a single circuit as may be practical in the course of a day. Generally speaking four batteries could be charged in a day of 24 hours on a single circuit, for small probability exists that all would be exhausted and would require a complete charge, but this statement presupposes that there is practically continuous charging, when as a matter of fact such a condition is rarely met with.

When vehicles are in use during the day much of the charging is done at night, and as a rule the cen-



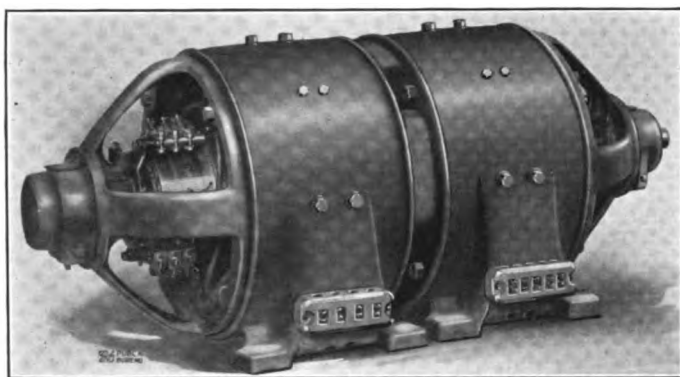
Commercial Type of Mercury Arc Rectifier, the Centre Machine Panel Carrying the Indicating Instruments.

tral stations encourage the use of current during the "off-peak" period, this making for a more uniform distribution of light and power. If a garage be devoted to public service this also necessitates facilities somewhat in excess of the demands by regular patrons. For the reasons stated the needs of the garage may be such that a large and a small generator set will be the more economical, or possibly the mercury arc rectifier will be the most satisfactory because it can be utilized with excellent efficiency at a 25 per cent. load, although the economy is increased with the load.

Regarding the motor generator set, the mechanical design and construction need not concern the vehicle owner. The machines are built by thoroughly dependable manufacturers and with lubrication and reasonable attention are absolutely reliable and will



Assembly of Rheostat Units Mounted on a Base and Placed on a Floor or Shelf, and a Side View of a Unit, Showing Its General Construction.



An Example of a Direct Current Motor Generator Set.

endure for years in daily service. They can be regarded as entirely satisfactory for the purposes they are recommended by the makers, and will positively do a definite work up to capacity requirements.

The use of the motor generator necessitates the installation of the equipment that is used with the direct line circuit, this including the rheostats and the switchboards or charging panels, the machine merely being a means of converting the current. Some garages, where the charging demands are variable, have two motor generator sets, supplying two voltages, the smaller being used to charge the batteries in the smaller vehicles. Of course this does not change the character of the other equipment, which is standard throughout.

The mercury arc rectifier is made in a number of types for different purposes, and classified by sizes. They are built with ampere capacity and with direct current voltages, and special rectifiers are constructed to meet conditions that are unusual and for service for which so-called standard machines are not practical. To illustrate: One manufacturer makes one type that is standardized with five sizes, of 10, 20, 30, 40 and 50 amperes capacity, and with direct current voltages ranging from 10 to 100 when operated from a 110 volts alternating current, and from 20 to 175 volts when used with a 200 volts current. Special rectifier sets are built to supply higher direct current voltages from a 220 volts alternating supply, and rectifiers up to a maximum of 350 volts direct current in capacities up to and including 50 amperes, are very useful. Thus the reader will understand that rectifiers can be procured that are adapted for nearly any charging service that may be required.

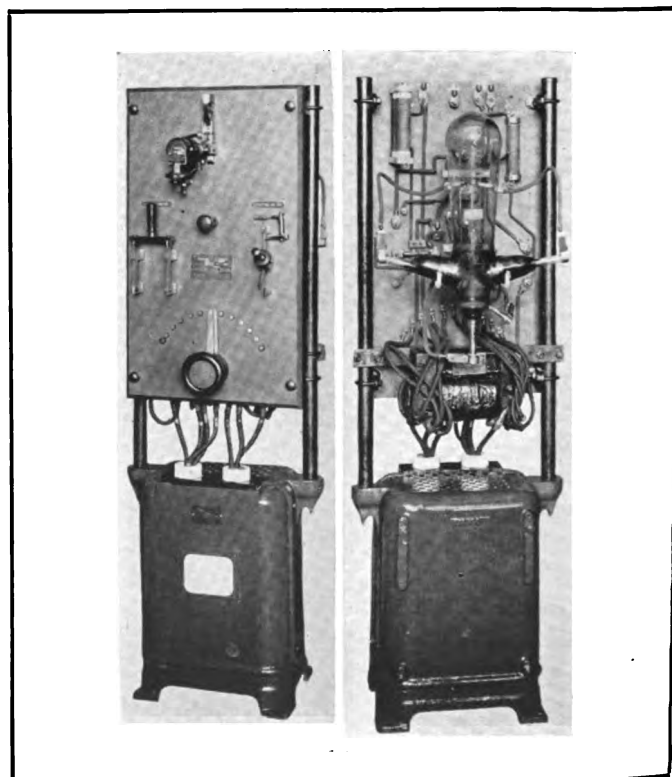
The efficiency of any mercury arc rectifier will vary with the direct current output, because there is a definite voltage drop in the mercury arc in the rectifier tube, irrespective of the current or the voltage. For this reason there is lower efficiency at low voltages than at higher voltages. The efficiency of the rectifier is practically the same from one-third of the current up to the maximum current output, though slightly greater at the low current than at the higher. Thus, at 60 volts direct current, the efficiency would be about 70 per cent., at 70 volts about 75 per cent., at 100 volts about 78 per cent., and at 175 volts and higher the effi-

ciency would be increased to from 80 to 82 per cent.

In addition to these standards other types of rectifiers are built, these being designed for private garage requirements or to meet special conditions, where the current frequently is unusual, and rectifier tubes are produced for varying conditions. The frequency of the current may range from 25 to 125 cycles or higher, a cycle meaning the number of alterations of the current in a second.

To understand the purpose of a rectifier, statement should be made that with an alternating current the movement is in either direction in a circuit, much as the action of the tides of the ocean. To illustrate, the energy will start at zero and increase to maximum, and will decrease from maximum to zero in the one direction, and will then start from zero, increase to maximum and decrease to zero in the other, so that the direction will be alternately reversed and the poles will be alternately north and south or positive and negative.

Regarding a light as an example, these changes are made so quickly that there is no perceptible variation in the current, and the number of changes must be sufficient so that there shall be no wavering or flickering of the light generated. The number of changes is referred to as "frequency," the movement of the current in one direction and an alternation being regarded as a "cycle," so that "normal frequency 60 cycles," for instance, will mean that the current is moving in either direction 60 times each second. Because of obvious reasons the machines must be constructed to meet these different conditions of current, with similar regard for voltage, amperage and the service required of the equipment.



Mercury Arc Rectifiers—From Left to Right: Front View of Panel Without Instrument; Rear View of the Same Panel.

As with any machine or instrument, the rectifier is most efficient when it is worked to its capacity and with the current for which it is primarily designed, but the losses through variability of work are less than with any other form of equipment that is as yet available. The greater utility of a machine the more the cost, but in cases where a definite duty can be planned, as in a private garage, the range can be more limited without sacrifice of any desirable quality.

Generally speaking a rectifier is necessary for each charging station, that is, a machine might be worked continuously and utilized for three or even four batteries during a day of 24 hours, but no more than one battery can be charged at a time, save when specially adapted for such service, though in some instances, as has been stated, a type is built that will charge 180 cells of lead battery, connected in series multiple, at 20 amperes a battery. This service is equivalent to charging four 44 cell single batteries, but the amperage is 20, so that the cells must be small, and it is evident that these could not be of a type that could be used in anything else than a pleasure vehicle. The capacity of the rectifier is, however, 40 amperes, 45-230 volts, so that it can be used with a single battery of much larger size. This type of rectifier can charge 90 cells of lead battery in series, and for that reason it is extremely serviceable.

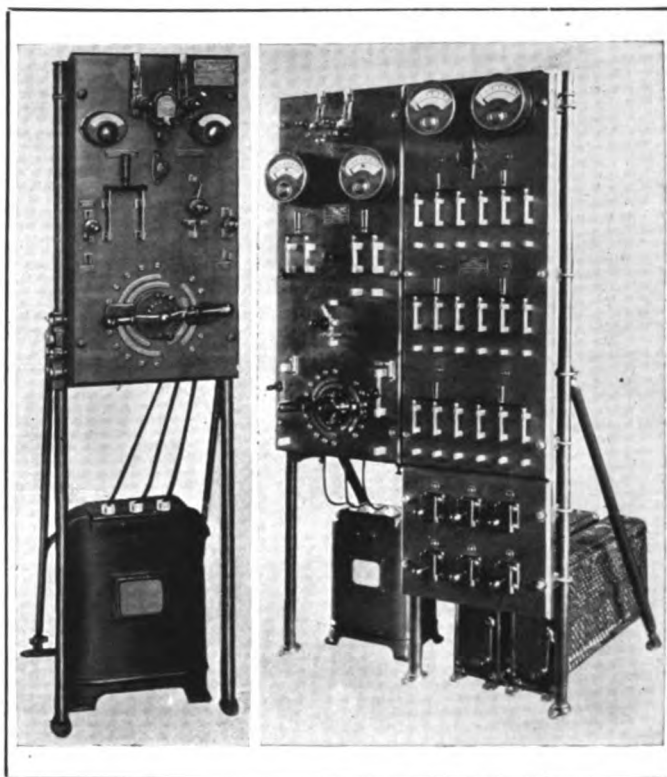
Because of the possibility of charging more than one battery at a time the rectifier is built with a rectifier and a distributing panel, the charging instruments being connected to the latter. With the construction designed for public garage service the range of voltage is from 45 to 230 volts direct current when operated from a 220-volt, 60-cycle alternating current, and from the panel the batteries may be connected in series and series multiple. With this arrangement the external connections are made as with the multiple charging system, save that some care is necessary in grouping the batteries so as to secure equalization of the charging voltage on the different groups.

The charging capacity of a rectifier is limited to a definite maximum amperage, but when necessary two or more rectifiers can be connected in multiple, and the amperage regulated to whatever standard may be required, so that with such changes as are required for the distributing panel several machines can be utilized for large batteries when desirable, or can be used separately up to the full capacity.

One of the decided advantages of the use of rectifiers in a public garage is that they may be installed as units and the number increased to keep pace with the development of the service. One panel can be operated as efficiently as a number and these are usually equipped for charging on six circuits, this permitting equalization. When operated in series multiple there is but comparatively little loss of current in the rheostats. What is known as the commercial vehicle type of rectifier is designed for charging

ing at a 30 or 50 ampere-hour rate a 40-44 lead cell battery, and the specific use is in garages where the batteries are approximately the same number of cells and the ampere-hour charging rate is not variable. Such rectifiers are built with panels that are fitted with and without instruments and each machine is a complete unit, so that a charging outfit may be begun with a single rectifier panel with instruments, and this installation increased by adding rectifiers with panels without instruments.

With rectifiers of this type the instrument panel is equipped with voltmeter and ammeter, and on each panel is a double-pole potential receptacle, one side connected with the voltmeter on instrument panel, and the other side with the direct current terminals of the rectifier panel on which the receptacle



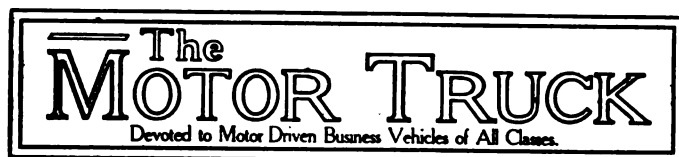
Mercury Arc Rectifiers—From Left to Right: Front View of a Single-Phase Type; Single-Phase Panel with Sub-Base, with Garage Equipment.

is mounted. With this, when the voltmeter plug is inserted in any receptacle, the voltmeter will indicate the voltage on that rectifier and the battery under charge.

(To Be Continued.)

LONGEST MOTOR MAIL ROUTE.

A motor mail route of 110 miles has been established in Carlsbad, N. M., the contract being held by the Carlsbad Automobile Company. This is said to be the longest motor car daily mail route in the United States, and the dozen post offices between Carlsbad and Lovington are now supplied with mail daily instead of three times a week. While 12 hours are allowed under the contract for the 110-mile trip, it is usually made in about seven hours.



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Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

INCREASED TRANSPORTATION COST.

Every reason exists why the cost of railroad and water line transportation shall steadily increase. The demands of labor alone, which are usually acceded to, are such as to demonstrate this result must obtain. For many forms of transporting, at least between commercial centres within 75 or 100 miles, motor trucks can be utilized to distinct advantage, large machines making the through runs in either direction and the loads being distributed by smaller vehicles. There are opportunities developing daily for the use of trucks for intercity haulage, which are rarely accepted yet are certain to be productive of profitable business. The railroads will always serve a logical purpose for long hauls, but as they are now operated they cannot afford a service that will eliminate a part or all of terminal distribution and collection. This is intensely practical with motor vehicles.

TRACTORS AND TRAILERS.

The systematic promotion that is given the motor vehicle industry by the French government, and particularly with reference to machines of types that will be serviceable for military purposes, has undoubtedly brought about great development. In the United States the attitude of the nation has been particularly indifferent, and departments that might have large use for machines have done nothing to develop those types that might be utilized advantageously by them. The

industry has been left to its own resources, and without substantial organization, and subordinated to the manufacture of pleasure vehicles, the results have been by no means what might have been with governmental interest. Tractors and trailer trains promise much for economical highway transportation, but the possibilities have been absolutely neglected.

UNIFORM TRUCK ACCOUNTING.

The necessity of manufacturers of motor wagons and trucks providing those who purchase their machines with a sufficient and satisfactory form of accounting for work and operating cost, is obvious. The vehicles will do work up to capacity with entire satisfaction if intelligently used, and will generally endure if not neglected or operated by incompetent drivers. But the result is entirely dependent upon supervision. With accurate knowledge of expense or haulage, economies can be determined and made effective, but unless these data are available maximum operation is impossible. If the owner can be made to understand the value of accounting he will realize material benefit through it.

DEFINE THE WORD SERVICE.

Organized interests of the motor truck industry will meet in October, in all probability, to determine general policies that will be practical benefits. If there is any subject that should be deliberated, it is a standard definition of the word "service" as applied to the sale of all freight carrying machines. Competition has led some manufacturers to make or imply conditions that have been assumed necessary to attract purchasers, and with rare exceptions these have been accepted by the industry until a situation is reached that obviously cannot continue. Service is a necessity, but no manufacturer can afford to have the word mean continuous maintenance. The proposed congress will be an opportune time to clearly define the responsibilities of the manufacturer, agent and purchaser.

MOTOR TRUCKS IN ARMY SERVICE.

The uses made of motor trucks in the war operations in Europe will not be fully known until statements are made by those who shall have opportunity to observe at least the movement of the forces and the utilities of the machines. Europe is not as cobwebbed with railroads as is the United States, but the roads are more generally improved in most of the principal nations. This condition will result in utilization of machines in greater numbers than might be anticipated. Army requirements will necessitate specially devised means of protection, such as are not now afforded, and which only experience can suggest. Appearance is unimportant, but long endurance of the machines in the hardest kind of service, and safety of occupants from warfare dangers are vitally essential.

FRENCH TRUCK AND TRACTOR TRIALS.

Entrants Smaller in Number Than in Previous Year---Great Interest in Motor Agricultural Machinery in England---Hydraulic Transmission Agrimotor.

WHILE from the viewpoint of the government the standardization of motor trucks and tractors to meet the requirements of the French army is extremely desirable, and the annual reliability trials organized and directed by the Minister of War of France have undoubtedly been promotive of material development of the machines, there is great uncertainty whether these national competitions and the policies of subvention will be continued. By this is meant that unless events transpire that will materially change the views of the industry and the governments the co-operation between them may not continue after the periods already provided for.

There are two reasons for this, the one being the conviction of many of the manufacturers of trucks and tractors that the production of them to subvention requirements is a decided retardation of the industry, and the other the unwillingness of the government to provide sufficient subvention premium and period to justify the additional cost of the vehicles to the maker and, consequently, the purchaser. The leading interests of the industry state that because of the greater cost of machines built to the approved standards the demand is decidedly restricted, and the normal requirements for industrial and commercial use are not such as to justify the additional expenditure necessary for vehicles that will command the subvention premiums. Beyond this, the subvention premiums are not such as to reasonably compensate the builder or the user.

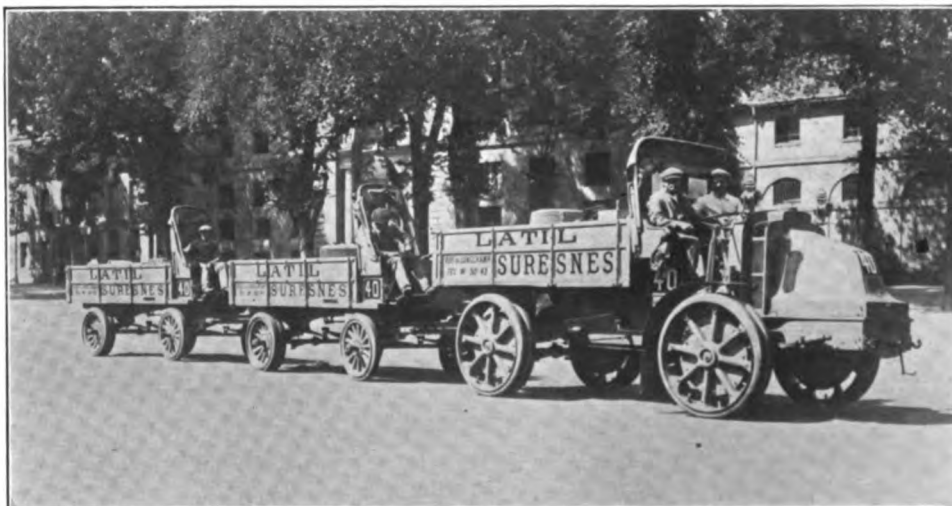
The French Minister of War is now conducting the sixth annual trials of trucks and tractors, the competition having been begun June 29, and they will continue until August 4, to be followed by the supplementary tests and examinations required. There was reason to believe that the trials would be the largest ever conducted by the government, but through different causes the number of entrants to start was decreased until the total competing is not as large as last year, and if the attitude of the industry is to be regarded there is excellent reason to believe that this will be the last that will take place, —at least unless there is material reason for a change of view.

That the situation may be understood it may be well

to explain that the government has annually made appropriation for subvention, specifying the dates the payments of premium shall be begun and ceased, and because the fund set aside for subvention purposes is limited, while the number of machines is increasing constantly, the deficit of any one appropriation must be met from that subsequently made. To illustrate, the subsidy premium for vehicles that are approved in the trials now in progress will expire by limitation in January, 1916, or practically a year and a half. Beyond that time there is no insurance that the government will provide for subvention.

The organization representing the industry is the Chambres Syndicale of Motor Manufacturers, and analysis of the conditions to be met has apparently justified the conclusion that the subsidy fund available after 1914 would not be sufficient to make regular payments of the purchase premiums demanded by industrial owners, and there was good reason to believe that the fund provided for 1915 would be exhausted before the trial anticipated for 1915 shall take place.

The manufacturers are divided as to the future. Some believe that the subvention requirements are such that vehicles are built that are very different from those that would meet with the needs of ordinary business service, while the conditions imposed upon the manufacturers largely, if not quite, offset the premiums paid. The machines now being tried are the first to which the subvention authorized May 17, 1913, will fully apply, and when manufacturing is based on subsidy premium the industry will have interest only in machines that carry 3000 kilos, or 6612 pounds. Not only this, the manufacturers regard two alternatives, the decrease of the amount of premium that they can



Latil Four-Wheel Driven Tractor and Trailer Train, Built to Compete in the 1914 Trials, Organized by the French Minister of War.

claim, and requirements more stringent than ever.

To make this clear, statement should be made that the use of steel tires is prohibited, even when weight only is carried, and another provision is that the machines shall be so equipped that side-slip or skidding is prevented, this being a condition that is now applied to trucks. What is even more exacting is the requirement that trucks must have power to haul on a dry macadamized road having a grade of eight per cent., a vehicle identical to that under test. The claim is made that this means either larger motors or greater reduction of gears, increasing weight and the manufacturing cost, a stringent necessity being that all vehicles be fitted with ball bearings made in France.

The trial now in progress is over six different circuits with Versailles as a centre, from which tours are made daily, so that each route is traversed four times, the longest run being 152 kilometers (95 miles) for trucks, and 108 kilometers (67½ miles) for tractors. The tractors entered are four-wheel driven types. Eight of the tours must be made with gasoline, eight with carburetted alcohol and eight with benzol.

In all 114 vehicles were entered for the trial, but this number was greatly reduced at the start because of some of the manufacturers not being satisfied with the conditions, and four were not in readiness. Of the entrants 15 makers are represented by machines, there being two each of the Mors, Rochet-Schneider, Schneider, Buire, Barron et Vaille and Dewald; four each of Latil and Panhard-Lavassor trucks and two each of tractors built by the same makers; six Saurer, Delahaye and Renault trucks; six Peugeot and six Clement-Bayard trucks, including two each of the colonial types, and eight each of Berliet and De Dion-Bouton trucks, including two each of the colonial types, making a total of 56 standard trucks, eight colonial type of trucks and four tractors, or 68 in all.

Much interest obtains in the colonial types of machines, which are designed for service in the colonies or long distances from the factories, and where parts can be obtained with difficulty or extreme delay. The road conditions are decidedly different, for the French highways are regarded as being of the best of Europe. The requirements are that this class of vehicles shall be particularly well protected from dust and water, with pans that will shield the mechanism. There must be a road clearance of not less than 70 centimeters, or 27.55 inches, and while rubber tires must be fitted the machines must be so built and equipped that they may be operated with steel tires.

In the 1913 trials 17 manufacturers entered and competed with 66 trucks and eight tractors.

Following the tours the machines will be subjected to different tests, hill climbing, braking efficiency, towing, and to mechanical and technical examinations. The report of each machine will then be passed upon and a general report filed by Commandant Ferrus, who is in charge of the trials.

Whether or not the trials were concluded before the development of hostilities between France and

Germany is unknown, but there is extreme probability that the machines are now in actual service in France.

MOTOR OMNIBUSES IN LONDON.

The total number of licensed motor omnibuses operated in London on June 30 was 3426, this being an increase of 20 as compared with the same date of the previous month. These are mostly operated by three large companies, but the total includes all that are in general use for passenger service.

STEAM TRUCKS IN ENGLAND.

The steam motor truck is steadily on the increase in England, and extensive developments are being made in this vehicle. Speaking on this subject, G. W. Watson, an eminent English engineer, states in the *Liverpool Journal of Commerce*: "The design and construction of steam wagons and tractors by British builders has progressed to such an extent as to place home manufacturers absolutely beyond all competition by foreign builders in both home and foreign markets.

"The steam wagon and the tractor are both peculiarly British productions, and in spite of, or probably because of, the keen competition by petrol wagon builders, their designs have continued to make progress, and increasing numbers of steamers are sold each year. The increase of use is likely to be even more rapid in the future if the present tendency toward inflated prices of liquid fuels is carried further. In recent articles it has been shown that even on the question of possible daily mileage, the arguments in favor of the petrol wagon are gradually being rendered less effective by the advancing use of superheated steam."

ENGLISH MOTOR FARM MACHINERY.

The annual show of the Royal Agricultural Society of England, held at Shrewsbury, June 29-July 4, was of unusual interest to those engaged in agriculture as well as to the industry producing motor driven machines of all kinds. Just now a concerted endeavor is being made to bring to the attention of the people as a whole the vast economy of highway haulage to the agriculturist, and the utility of labor saving machines. The show was the largest of the year in England and was attended by thousands from all parts of the kingdom, the visitors including many engineers, who have to do with the construction and maintenance of roads.

The comment is made that the prevailing scarcity of farm labor has impelled the owners of tillable land to closely examine and consider the desirability of motor implements that will do the greatest work for a given expenditure, as well as requiring minimum initial investment. Tractor engines, which may be adapted for haulage, plowing, cultivating, reaping and power purposes when needed serve the greatest diversity of needs, but in addition those intended solely for transportation have developed much attention.

The show was noticeable from the fact that much

municipal equipment was displayed, there being a considerable number of fire apparatus in addition to the machines designed for construction. In connection with the show was an unusual opportunity for colonial development, this resulting from the visitation of a group of more than 50 South African farmers, who, making an excursion about England, gave over several days at the exhibition.

The exhibition included a considerable number of steam vehicles of all kinds, these appearing to be favored by many because of the character of fuels that may be used and the general knowledge of the efficiency of the steam engine. The showing included various types of tractors and trailers, trailer towing devices, water ballasted road rollers, road rollers convertible to tractors, combination road roller, road sweeping and watering machines, macadam patching outfits, tractors fitted with capstans for loading and towing, tractors fitted with cranes for lifting heavy loads, plowing machines, threshing machines, motor grass cutters, hoeing machines, some of them being ingeniously designed.

One construction was a three-wheel outfit designed for highway haulage and for plowing, as well as being a portable power plant. Another was a two-furrow power plow that is steered by the plowman, and a number of machines were arranged for self-steering save at the end of furrows. Included in the display was a number of power dumping bodies. The mechanical construction of the machines was a subject of decided interest, the designers seeking to accomplish positive control at all times, whether or not the work was on highways or rough ground.

INTERNATIONAL RUBBER EXHIBITION.

The fourth International Rubber Exhibition in London, which was concluded July 9, included a large section given over to the display of tires and equipment for industrial motor vehicles. One of the subjects of considerable interest was the exhibits of synthetic rubber made from artichokes, and which may also be made from cotton. The material has the general appearance and characteristics of the natural product, and the statement is made that it has at least equal resiliency and surprising endurance.

A concern that has been for a considerable period engaged in manufacturing tires has become convinced of the value of the substitute and proposes to utilize it to a considerable extent. This firm is well known and has a thorough knowledge of the requirements for all kinds of tires, and the use of the synthetic rubber has been decided on after long experi-

mentation and comparison with natural rubber. The cost of these synthetic tires as compared with other types is not stated, but the inference is that the substitute material can be so utilized that the market value of tires need not be materially influenced by the available supply of natural rubber.

In connection with the production of crude rubber the statement is made that the cost has been considerably lessened by the utilization of motor vehicles on the plantations where it is produced, transportation being an item of expense that enters into the fixing of the market prices.

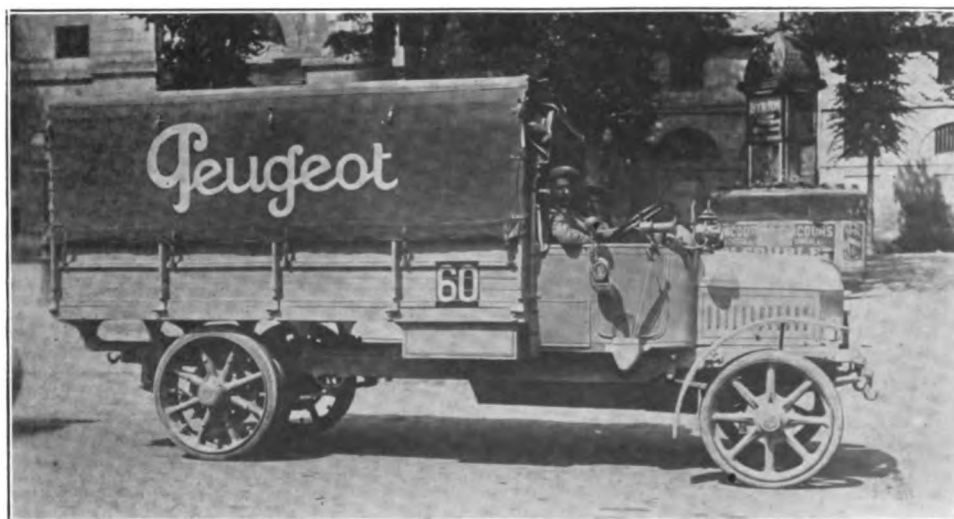
One exhibit made by the Polack Tyre & Rubber Company was a method of installing truck tires, in which the shoe is installed on the steel felloe band by the use of a series of specially treated wood wedges.

MOTOR FUEL IN SOUTH AFRICA.

The Senate of the Union Parliament of South Africa has passed a resolution that authorizes an inquiry to be made relative to the usefulness of alcohol as a fuel for internal combustion engines, and, if the investigation proves satisfactory, to give its encouragement to the manufacture of alcohol fuel within the states included in the union. The subject was discussed and the determination reached by the body because of the possibilities for producing alcohol from cheap material and the necessity of providing not only a new industry, but of reducing, if possible, the price of fuel.

HYDRAULIC AGRIMOTOR TRANSMISSION.

A French firm, Mistral & Borche, has developed a light agricultural tractor that differs from the conventional types in several important details. The machine is light in weight and is mounted on three wheels, the two in front affording the traction, and the steering being by the rear wheel. The cultivating tools are mounted behind the rear wheel. The power is generated by a motor that drives a pump and hydraulic motors, water being circulated through the system. The engine power is governed by ignition and fuel feed



Type of Peugeot Truck, Equipped with Driver's Enclosed Seat and Folding Top, Designed for Service in the French Reliability Trials.

variations, but the pump stroke is variable so that a greater or less volume of water at varying pressures may be forced through the hydraulic motors, the effect being the same as with variations of gears. The implements used for cultivating are actuated by two parallel shafts, one of which carries a series of eccentrics.

PUBLIC TRANSPORTATION SERVICE.

A plan for the development of public transportation service in several of the German and Russian provinces along the Baltic sea has been determined by the coalition of Russian and German banking interests and French and German manufacturers of motor vehicles, and the purpose is to carry both passengers and freight. The Russian government has sanctioned the proposition, and the plan is now before the German government for its approval. The capital of the company is fixed as 4,000,000 roubles, and the purpose is to operate on an extensive scale. As the service will not compete with existing railroads it is expected that the support given by the people will be remunerative.

WILL BUILD LIGHT TRUCKS.

The Bingham Manufacturing Company, Cleveland, O., has taken over the plant and adjoining property of the Electric Locomotive & Engineering Company of the same city, and will go into automobile manufacturing. Plans now made are for the building of a light delivery truck, which will have a 25 horsepower motor, 114-inch wheelbase, and its body will be 42 by 78 by 52½ inches. It is expected to turn out about 30 cars a month at first and to increase to 100 cars a month later. The plant capacity is estimated at 500 cars a month. The company's officials claim it will be the cheapest truck for its capacity made in the country.

MASSACHUSETTS REGISTRATIONS.

The total registration of automobiles in Massachusetts for the first six months of 1914 was 64,717, as against 53,628 for the same period of 1913, an increase of 11,089. The registration of new operators was 11,525, 1846 more than in 1913, and the number of new chauffeurs registered decreased from 3028 in 1913 to 2795 this year. The renewals of operators, however, increased 5809 and of chauffeurs 1957 for the first six months.

The total receipts from all registration sources amounted to \$780,363 for the first six months of the current year, compared with \$646,323 for 1913, a gain of \$134,040.

A 'bus line for the transportation of passengers and freight has been established by W. L. Cummins of Twin Falls, Idaho, to operate between Twin Falls and Thunder Mountain, using a Gramm truck.

PROTEST AGAINST TRUCK TAX.

A protest against the demonstration tax now imposed upon motor truck agents in New York City has been lodged with the Merchants' Association by the dealers of that city. Manufacturers of and dealers in automobiles are required by the Callan automobile law to take out a general license which covers all of their vehicles prior to sale, such vehicles being identified by a single license number; these vehicles are not allowed for private use or hire.

However, it is generally necessary in the case of motor trucks, to demonstrate the capacity of the truck before a sale can be made. But the Automobile Bureau of the Secretary of State's office holds that demonstrations with loads is a violation of the requirements of the law and demands that the manufacturers in such cases take out owners' licenses for these demonstrating trucks. This would compel the payment by the manufacturers in some cases of several thousand dollars annually for license fees. The failure to comply with this law, that is, the taking out of both an owner's license and also a general license required of the manufacturers, makes the driver liable to arrest and fine.

POPE PLANT TO CLOSE.

The plant of the Pope Manufacturing Company, Hartford, Conn., will close permanently August 20. This is the determination of George Pope, receiver, and it has met with the approval of Judge Marcus H. Holcomb, sitting in the Superior Court at Hartford.

Judge Holcomb has signed an order permitting the receiver to sell by piece-meal the machinery and raw material and other assets of the company, except cash and accounts receivable. There was considerable opposition to this plan of the receiver by the creditors of the company, as under it they will only receive about 70 cents on the dollar. The total indebtedness is \$1,800,000.

The Interboro 'Bus Company was formed recently to operate between Times Square, New York City, and the Shelborne Hotel, Brighton Beach. A three-ton worm-driven 'bus, built by the Hurlburt Motor Truck Company, New York, N. Y., has been put into service. It is expected that the 'bus will make two or three round trips daily between mid-day and midnight, and the fare one way will be \$1 a passenger.

The Indestructible Tyre Company has been incorporated in Wilmington, Del., with a capitalization of \$1,000,000 to manufacture tires of all kinds. The incorporators are: J. McLaren, F. B. Knowlton and S. V. Dowling, all of New York City.

The German Empire now has 9639 motor trucks in use, compared with 2823 in 1910.

LIGHT FARMING WITH AUTO TRACTOR.

UTILIZATION of the pleasure car for agricultural purposes, so that the farmer may quickly transform an automobile into a traction engine, is the purpose of the designer of the Auto Tractor, built by the Auto Tractor Company, Niles, Mich. This machine can undoubtedly be used with a motor delivery wagon or light truck, but the general application is with automobiles, so that the farmer may have the service of a car and yet at a small expense convert it so that it may be utilized for plowing, harrowing, sowing, reaping or harvesting. The belief is that this will better meet the requirements of the majority of agriculturists than any other form of farming equipment, for the combination can be made in comparatively short time and used whenever necessity demands.

Briefly the auto tractor consists of a frame that is suspended beneath the chassis of a car or wagon and at the rear end is a large dead axle on which are mounted two wheels six feet diameter, with heavy rod spokes and wide steel rims fitted with spikes. On the inner sides of the wheels is mounted the spur

and there is a pump operated by the gearing. The use of the tractor necessitates cutting the hose connecting the water outlet manifold of the motor and the radiator and installing a permanent connection that has two ways, to which is attached hose that extends down through the dust pan either side of the radiator. These two sections are connected with pipe at either side of the tractor frame, which extends to and is connected with the water pump on one side and with the tractor radiator outlet on the other.

The connections with the car radiator are by unions that can be tightened, or loosened by hand. The water system of the tractor, when filled, has capacity of 24 gallons, which is sufficient to keep the motor cool, no matter how steadily it may be driven. There is a positive circulation that can only be reduced through evaporation. The engine is driven at high speed all the time the tractor is in service, the only change in vehicle movement being afforded by shifting a tractor clutch.

The compounding of the driving power of the mo-



The Niles Auto Tractor: At Left, a Pleasure Car Affording the Power to Haul a Gang of Plows; at Right, the Machine Ready for Attaching to an Automobile or Truck.

gearing that serves to transmit the power from the automobile to the tractor wheels.

Two saddles are clamped to the rear axle of the car and the hub caps are removed. Two castings are applied that fit close to and are retained by the hub rivets, and two spur gears are fitted to the hubs and secured by steel hub caps. As these gears are turned by the axle shafts they mesh with the gearing of the tractor wheels and the power is applied with so great a reduction that the ordinary speed of the machine is two miles an hour in regular work, but this can be increased to four miles an hour while being driven on roads. When fitted the tractor elevates the rear of the car about six inches, but the forward end of the car is driven on the forward wheels.

Large Auxiliary Cooling System.

The forward end of the tractor frame is carried on a bolster fitted to the front axle of the car. The road clearance is somewhat reduced. The rear end of the tractor frame carries a large radiator and water tank

and there is a pump operated by the gearing. The use of the tractor necessitates cutting the hose connecting the water outlet manifold of the motor and the radiator and installing a permanent connection that has two ways, to which is attached hose that extends down through the dust pan either side of the radiator. These two sections are connected with pipe at either side of the tractor frame, which extends to and is connected with the water pump on one side and with the tractor radiator outlet on the other. The connections with the car radiator are by unions that can be tightened, or loosened by hand. The water system of the tractor, when filled, has capacity of 24 gallons, which is sufficient to keep the motor cool, no matter how steadily it may be driven. There is a positive circulation that can only be reduced through evaporation. The engine is driven at high speed all the time the tractor is in service, the only change in vehicle movement being afforded by shifting a tractor clutch. The compounding of the driving power of the mo-

Method of Attaching Tractor.

The method of attaching the tractor is said to be exceedingly simple. After attaching the saddles to the rear axle, the bolster to the forward axle, and the gears to the rear axle hubs, the tractor frame is placed on the ground and the car backed over it until the rear axle touches the frame. Two ropes are then

run from the tractor axle to the hubs of the car wheels, which serve as winding drums and the car is drawn by its own power upon the frame into position, when the hub gears will mesh with the tractor wheels. The coupling is then completed and the tractor is ready for operation. The statement is made that one man can do the work of coupling the tractor alone. Back of the tractor is an adjustable drawbar, to which the farm implements are attached.

Different Widths of Wheel Rims.

In practically all the farming work that can be done with a tractor the machine is used with the front wheels of the car and the tractor wheels on reasonably solid and smooth surfaces. The tractor wheels are usually furnished 12 inches width and to these six and 12-inch extension rims may be fitted, increasing the rim widths to 18 or 24 inches as may be desired, as for service on soft ground. The auto tractor weighs, ready for coupling, with 18-inch wheel rims, 5800 pounds, and, with the average car, between four and five tons. This is, of course, very light, considering the haulage that is done, but the manner of suspension of the car throws the greater part of the weight on the traction wheels, and the very large reduction by gearing insures positive propulsion.

The number of plows that may be worked, for instance, depends upon the depth of the furrow and the power of the car, but with the average pleasure car, of say 30 horsepower, the auto tractor will be the equal of from six to nine horses.

Besides the haulage work the auto tractor may be used as a stationary power plant for the operation of threshing or any other use that may be made of a portable engine. This is done by fitting the tractor with belt pulleys and from these running belting wherever practical. The tractor gearing is placed in a neutral position and the car engine may be worked to normal speed, the large cooling system insuring against heating.

TO MAKE ELECTRIC MOTORS.

The Marathon Electric Manufacturing Company has been organized at Wausau, Wis., with \$150,000 capital to manufacture electric motors, generators, and general electrical equipment of all kinds. Justin Lebovici, who has been an engineer for the Westinghouse and Crocker-Wheeler companies, has been appointed general production manager, designer and chief engineer.

E. M. Bischoff, formerly in charge of the manufacturing and sales department of the Crocker-Wheeler Company, is secretary, treasurer and general manager. The company is backed by a number of business men and manufacturers of Wausau and Marathon counties. The new forest products laboratory, built by the government for research and experimental work in pulpwoods by the forestry department of the Department of the Interior, has been purchased outright with equipment and will be used for elec-

trical manufacturing. The laboratory was offered in the market because the pulpwood work was finished and the government had no further use for the plant.

DECLINE IN TRUCK EXPORTS.

The total exports of trucks for the month of May, 1914, was 99, valued at \$127,624. This is a loss when compared with 141 exported for the same month of the previous year, the value of which was \$236,383. The exports of passenger cars for May, 1914, totalled 3157, having a value of \$2,857,601, as against 2895 for May, 1913, valued at \$2,918,806.

There is also a decline in truck exports for the 11 months ended May 31, 1914, but an increase is shown in the number of pleasure cars. Trucks exported for 11 months of the current fiscal year totalled 694, valued at \$1,061,354, as against 878 for 1913, valued at \$1,569,750. Pleasure cars exported for 1914 were 26,324, having a value of \$23,522,081, compared with 22,254 for 1913 valued at \$22,252,032.

NEW YORK TRAFFIC REGULATION.

Recommendations have been made to the police department and to other municipal authorities by the Citizens' Street Traffic Committee of Greater New York, which are expected, if adopted, to lead to material improvement of congestion of vehicular and pedestrian traffic in Fourth avenue between 33rd and 34th streets, there being at this point surface and subway stations as well as material cross-town traffic in 34th street. The purpose of the committee is to study localities with a view to making similar recommendations for public benefit.

KALAMAZOO 3000-POUND TRUCKS.

The Kalamazoo Motor Vehicle Company, Kalamazoo, Mich., which was established nearly a year ago, is building a 3000-pound delivery wagon chassis, which is being distributed to a locality market and is produced conservatively. The output for 1914 will be from 25 to 30 machines, but the production will, no doubt, be materially increased for 1915, and a considerably larger number of workers will be employed.

A 'bus line has been inaugurated in Washington, running between Tacoma, Sumner and Puyallup, under the name of the Puyallup Rapid Transit Company. In Kent, Wash., a B. A. Gramm's truck has been put into similar service by George Spencer, to operate between Tacoma and Kent.

S. E. Anderson, formerly with the United States Motors Company and later chief engineer of the Falls Machine Company, Sheboygan Falls, Wis., has been made chief engineer of the Shaw Motor Company, Chicago, Ill.

UTILITY OF THE ELECTRIC VEHICLE.

E. J. BARTLETT, who is a very active factor in the sales department of Baker Motor Vehicle Company, Cleveland, O., prepared a paper that was read at the recent convention of the New England section, Electric Vehicle Association of America, and allied interests, held at Boston, which was of especial interest from the fact that it dealt with practicalities of electric vehicles, both pleasure cars and service wagons. The paper emphasized the belief, founded on experience, that there were distinct fields for both electric and gasoline machines, which seldom overlapped when the requirements of service were carefully judged. Mr. Bartlett expressed the opinion that there was not so much a demand for increased mileage or greater speed with electric vehicles as there was necessity of better understanding how to use the machines that are now built.

Through the entire presentation is an endeavor to eliminate the impression that might be created that the electric and gasoline interests of the motor vehicle industry are competitive in the sense that the term is usually applied. As a matter of fact the purpose is to demonstrate that neither is in any manner at conflict with the other, and that the two are harmonious in their endeavors to generally promote the use of power driven vehicles.

The subject of the paper was "The Utility of the Electric Vehicle, Pleasure and Commercial", and it was presented by Frank J. Phelps, New England representative of the Baker Motor Vehicle Company. The paper follows:

A great deal has been said and written about the electric vehicle and what it is doing. "Utility of the Electric Vehicle" as the subject of a paper to present at this meeting of electrical experts may sound elementary. It is an old topic, but it is the liveliest topic of the day, to the user and central station operator, as well as the electric vehicle manufacturer. It is doubtful if any of us fully realize the work the modern electric vehicle is doing; its wide scope and the wonderful possibilities it has of revolutionizing our passenger and merchandise road operating systems.

PLEASURE VEHICLE.

Several years ago we drove, as an experiment, an electric runabout nearly 250 miles on a single battery charge; I believe this figure has since been exceeded. For some time a specially designed racing car, the "Baker Torpedo", held the world's record for motor car speed, making a mile in 42 seconds, or at the rate of over 85 miles an hour. You are all familiar with the run from Boston to Chicago that was made late last fall by a Boston built electric roadster.

These accomplishments are of general interest, showing what the electric has done. The electric, however, is not and probably never will be, a high speed machine suitable for touring purposes. It will never seriously compete with the gasoline car for such work, although in time, as cross country roads are improved and charging facilities become more numerous, the electric will be used to a limited extent in short tours from city to city.

Speed and Mileage Factors.

The utility of the electric pleasure car does not depend upon high speed and long mileage, although it has sufficient speed and mileage for ordinary town and suburban driving. The speed of electric vehicles on the market averages some 22 miles per hour for the lighter machines and 18 to 20 miles per hour for the heavier five-passenger enclosed cars. The mileage of such machines under ordinary fairly level city and suburban street conditions is seldom less than 75 miles per battery charge. It is not unusual for people who are careful in the operation of their cars, to obtain 1000 miles for every 10 battery charges. We frequently obtain such reports from our customers.

The feeling that the electric pleasure car is essentially a

"woman's" car is passing away. Certain features of the electric pleasure car, such as its beauty, comfort and lack of mechanical complications, appeal to the woman purchaser, not only because she feels she can drive an electric easier than a gasoline car, but rather because she cannot see the value of the complicated mechanism necessary to the modern gasoline car which even approaches an electric in ease of operation. She appreciates the fact that an electric is simple in construction; that it only has a few parts which could possibly get out of order; that it is always ready to use; cannot be stalled in traffic; has a short wheelbase to facilitate turning, and is light and easy to operate.

The same opinion is fast gaining ground among men. Troubles were more numerous in the old days and not so well charted. There was perhaps a feeling of pride in being able to drive a gasoline car and to fix it if it went wrong. The very fact that most men are now amateur automobile repair men, means that the fascination of making minor repairs and getting covered with grease and dirt no longer exists.

Practical Utilities Developed.

There are a great many business and professional men who have been experienced gasoline car drivers for years, who are turning to the electric as the handy car in which to get about town. In the majority of cases where a man buys his wife an electric, he becomes accustomed to using it more and more for his own town driving. Where two cars are owned, the family gasoline touring car stands more and more of the time in the garage. Touring for pleasure has become a family pastime to be indulged in now and then; it is no longer a hobby. The automobile has taken its place with the telephone, electric light and other mechanical appliances, considered essential to the comfort and happiness of the home.

In Cleveland, Chicago, Buffalo, Detroit, Rochester, and, in fact, in a considerable number of our larger cities, there are a large number of electric pleasure cars in daily use. You see doctors and lawyers driving them in preference to operating their own gasoline cars or having a chauffeur drive for them. Mother takes the children to school; daughter takes father to his office, and mother shopping; lunches with friends in one of the suburbs; goes to matinees, and the whole family goes for an evening drive along the boulevard. The electric has a utilitarian value for the entire family, individually and collectively.

Figuring the life, depreciation and all elements of expense, pleasure and service obtained, the electric pleasure car may be operated for about one-third the expense and one-tenth the bother of a high grade gasoline car. Cheapness, convenience and reliability for all purposes of the family and for all business and social usage, is stamping the electric as the family town car. Its utility may be in part realized by considering the large amount of the family driving that comes within its speed and mileage range, and the really small amount of touring done which would demand a gasoline car.

THE ELECTRIC TRUCK.

The utility of the electric truck is measured by the work it can do and the expense of doing it.

The work capacity of any trucking system depends on the load, speed and time operated. All three factors must be considered in determining what a truck can do under given conditions.

The usual standard sizes in which electric and gasoline trucks are built are half-ton, one-ton, two-ton, 3½-ton and five-ton load capacities. The speed of the electric is usually about 13 miles an hour for a half-ton truck to seven miles an hour for a five-ton truck, and the average speed of the gasoline trucks of similar sizes is some 25 per cent. higher. With normal service conditions, electric trucks may be depended upon for about 98 per cent. of the working time; gasoline trucks about 85 per cent. and horse about 75 per cent.

If we take as a comparison the number of ton-miles each type of truck would travel during a period of say, 300 working days, we get the following figures:

One electric truck—300x45x98 per cent. = 13,230 ton-miles.
One gasoline truck—300x45x85 per cent. = 11,475 ton-miles.

These figures are typical of many service requirements. The electric truck in the majority of cases will haul the same load as the gasoline truck, and haul it more miles per year in average service—for the reason that the electric while a little slower is a great deal more continuous in its operation. This comparison is true up to about 50 miles per day.

Continuous service is a guaranteed feature in a well built electric truck. It results, because the construction is simple, and has very few parts which can possibly get out of order. The storage battery today is reliable in its performance and its cost is not excessive.

Continuous Service and Reliability.

Those of us who have to do with electric trucks, do not always appreciate what the simplicity of construction means from a standpoint of continuous service and reliability. It does us good, now and then, to compare the simple construction of the electric (with which we are all familiar) with the complicated construction of the gasoline car. If, in imagination at least, we place ourselves in the position of the head of a company,

using a number of motor trucks, employing drivers at \$12 or \$15 per week, we can appreciate there is some satisfaction in knowing that the electric is a simple machine, and that its speed is predetermined. When the head of such a company thinks of the "wild Indians" which he has to employ as drivers, it is a comfort to think that in the case of his electric trucks he has no engine speed which must be delicately manipulated; no clutch to throw or gears to change. Even with the most careful driving of the gasoline car, there are general periodical overhauls to be done, carbon to be removed, valves to grind, cooling systems to freeze and many similar cases for intermittent service which cannot very largely come under the attention of any one man, but must be handled by the individual drivers, regardless of their responsibility. It is a fact—not theory—that at least 15 per cent. of the operating time of gasoline truck installations is required to keep them in operation the balance of the time.

This greater repair liability is due not only to the more complicated mechanism, but to the higher speed which such trucks attain. Speed has ruined hundreds of thousands of dollars' worth of gasoline trucks by shortening their efficient life, and this loss is causing many potential buyers to hesitate. Normal service requirements do not demand a higher speed than given by electric trucks. For unusual conditions higher speeds may be required. If so, they can be obtained by the use of gasoline trucks at an additional cost.

Longevity of the Electric Truck.

The long life of an electric truck is another important feature. The purchase of an electric truck installation provides for a permanent trucking system for 10, 12 or 15 years, by renewing batteries and tires. True, one can renew tires, engines, magneto, carburetor, clutch, transmission, countershaft, etc., in gasoline trucks, but one does not go that far very often, as it is not worth while. In from two to five years, depending on the type of car and service, gasoline trucks are sold or traded in. Second-hand gasoline trucks are a drug on the market, while it is almost impossible to purchase a second-hand electric truck. The reason is that the owners of electric trucks purchase new batteries and tires and keep them going. This charge for depreciation has a considerable bearing on the operating cost, and while it is not the purpose of this article to discuss, in detail, operating costs, it may be said in general, that an annual depreciation charge of 10 per cent. is liberal in the case of the electric truck, and to this depreciation charge could be added—in the case of the half-ton truck, \$1.86 per day; for the one-ton truck, \$2.27; two-ton truck, \$2.88, and 3½-ton truck, \$3.92; these charges covering the items of charging current, battery depreciation, tire wear and the replacement of miscellaneous small parts necessary to keep the truck in running condition.

With the yearly expenditure of the above amounts, the efficient life of the well built electric truck chassis is conservatively 10 years under normal operating conditions. All other expenses such as painting, body repairs, driver, storage, washing, polishing, etc., depend entirely on local conditions, and may readily be estimated by the purchaser.

Results from Actual Service.

I have, in the foregoing, tried to sketch, briefly, a few of the reasons for the utility of the electric truck. There is much more which could be said along the same general lines as to hill climbing ability of the electric, its freedom from fire risks; that inexpensive drivers may be used to operate it, and other arguments in favor of the electric with which you are all no doubt familiar. It would be possible to enumerate a lot of statistics showing the work done and the cost of doing it in numerous installations, but I believe that briefly the following record, which was compiled by one of our large customers located in the middle west, will show you plainly the reliability and the utility of the electric under severe winter operating conditions.

This record covers the winter months just passed, in which as you will recall, occurred some real winter weather, accompanied by heavy snow falls. During these months this particular installation worked 4900 truck days, of which 3400 were electric and 1500 gasoline truck days.

For the 4900 truck days there were 166 cases of trouble reported; 74 of these applying to electrics and 92 to gasoline trucks. I hope you will get these figures clearly in mind. They mean that, for every 100 electric truck days, there were two cases of trouble reported, while for every 100 gasoline truck days there were six cases of trouble reported; or three times as much trouble with the gasoline as with the electric trucks, and this result obtained through blizzards and snow storms.

It is interesting to know that 43 of the total 74 electric troubles were cases of exhausted battery, and that the earliest case of exhaustion reported for any truck was 5 o'clock in the evening, or after the truck had been out in the storm and snow at least 11 hours. The other troubles were principally broken chains and loose tires.

The gasoline truck troubles were mostly broken chains, loose tires, trouble with cooling, lubrication and ignition. Several cases of serious trouble were reported, due to the engines running without lubricant; the driver keeping his engine running continuously to prevent freezing, or to be able to start it, thus using oil faster than he anticipated. The result, of course, being burned connecting rod bearings, scored pistons and cylinders.

Conditions of Work Practically Normal.

Nearly all of these trucks had been in service some 18 months at the time this record was compiled. The battery equipment had thus seen considerable wear, so that the conditions were not unusually good, but were about the same as might be expected in normal service.

I have arranged these records on a truck day basis, that the percentages might be more readily applied to smaller installations. On a basis of what this installation is doing, one could operate a single electric truck under the same conditions 100 days through the dead of winter and have about one case of exhausted battery, and one broken chain, loose tire or something of the sort. If the truck was operated 100 days through summer conditions, the failure of the battery would be eliminated and there would be about one trouble developed during the entire 100 days' operation.

This is a wonderful record and drives home to those in close touch with such daily performances the all around utility of the electric truck.

I do not believe that this installation is doing any more wonderful work than are other installations of electric trucks operating from coast to coast. My company is continually making investigations of our trucks used in different parts of the country and under different service conditions, and as familiar as we are with the many good features of the electric truck, we frequently marvel at, not only the amount of work they do, but the small amount of expense and trouble involved in doing it.

Relative Fields for Motor Trucks.

One evening last winter in New York I was talking with a man connected with a company having several hundred motor trucks, both electric and gasoline, in their service. This man is in close touch with the work these trucks are doing and the delay and cost involved; his experience covering a period of several years with several makes of electric and gasoline trucks; some of the electrics being nearly eight years old.

This man said, during our conversation, substantially as follows:

"If every company having city trucking work to do could understand the merits of the electric truck when properly applied and cared for, as I do, the gasoline truck would be used for a comparatively small part of the city work. Neither truck will perform at its best when misapplied, and both types are essential to the most satisfactory operation of almost every large installation."

The design, construction and production of trucks has advanced to the point so our problem is no longer to make a truck for less money that will run faster and farther at less cost (desirable as such progress is), but rather to drive home to the prospective buyer the utility of the modern electric truck as now built.

Practical Uses of Electric Trucks.

There are two general methods of rail transportation—express and freight.

Freight is slow, but cheap, and handles the bulk of heavy shipping. Express is quick and important for some shipments, and expensive. Each has its field and for the most part these fields do not overlap.

There are a lot of goods being handled every day by the express method with gasoline trucks which should be handled on the freight basis with electric trucks. It is taking time to familiarize companies having trucking to do, with the utility of the electric truck, and as such realization is brought about, the true fields for the electric and gasoline truck are established.

It takes experience to learn the proper application of motor trucks in any particular business, and unfortunately most people who spend their money for such equipment feel it is their privilege to get their experience first hand, as indeed it is. As a result there were sold during the year 1913 perhaps 20,000 gasoline trucks. As a result of the installation of these 20,000 trucks there is a market in process of creation for perhaps two-thirds of this number of electric trucks. The owners of gasoline trucks are turning in increasing numbers toward the electric truck, and it is among companies who have had direct gasoline truck experience that we find our readiest market.

Gentlemen! The every day usefulness of the electric pleasure car and electric truck is being appreciated more now than ever before. Its performance is not brilliant in the making of speed and mileage records. The inherent characteristics of the electric vehicle will not permit of its competing with the gasoline machine for such work. Just as truly these same inherent characteristics permit of an economical operation which is being appreciated by the automobile buying public, as the novelty of the gasoline vehicle and its expense is lessened through its wide use.

Utility is the keynote which is entering into the purchase of automobiles, both pleasure cars and trucks, more and more, and utility is the one feature which will influence the purchaser of the electric vehicle more and more as time goes on.

The International Harvester Company will exhibit a complete modern farm at the Panama-California Exposition to be held in San Diego, Cal., in which the use of motor trucks will play an important role.

The Safety First Society of New York City is in favor of licensing drivers rather than the vehicles. This, it is said, will much reduce the fatalities, for it would place more responsibility on the drivers.

HINTS FOR PROPER MAINTENANCE.

IRREGULAR operation of the motor is generally caused by leakage of air in intake pipe connections, valve guides, poor mixture, etc., but if, after making the usual tests, the trouble continues, it is advisable that the exhaust valve spring be examined to note if it has lost its tension.

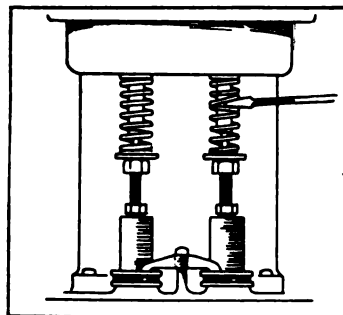


Fig. 1—Testing Exhaust Valve Spring.

If the spring be weak it will not seat the valve at low motor speeds, which will cause the motor to skip, a condition which is often ascribed to the causes above mentioned.

To test the action of the valve spring, insert the blade of a screw driver or similar shaped tool between the coils, as shown at Fig. 1. This should be done with the motor running. If the missing stops it will indicate that the spring has lost tension, and that either a new one is required or the old one needs stretching.

TIMING THE MAGNETO.

If the magneto has been removed during an overhaul of the motor or for repairs, a knowledge of timing the instrument is necessary. Timing a magneto is not difficult, the work requiring a knowledge of the cycle of the motor, its firing order, direction of drive of the magneto and the operation of the breaker box.

If the magneto is gear driven the teeth are generally marked, so that it is a simple matter to remesh the gears correctly, but one should bear in mind that the piston of the first cylinder must be approximately ready to begin the impulse or firing stroke.

For example: With a four-cylinder, four-cycle motor firing 1-3-4-2, and with the timing plan calling for the primary current to be interrupted when the piston is within $\frac{1}{2}$ inch of top dead centre, as shown at Fig. 2 A, the motor is cranked until the piston lacks but $\frac{1}{2}$ inch of completing the compression stroke. If the magneto be gear driven the marked teeth should mesh correctly. They may vary a tooth which may be corrected by moving the flywheel slightly to obtain the desired position. If the magneto is driven by a shaft through a coupling, the piston or the first cylinder is placed at top dead centre or completion of the compression stroke, and by slightly moving the flywheel clockwise or anti-clockwise, the driving and driven ends of the coup-

ling can be meshed or these members connected.

Care must be exercised in replacing a magneto to have the distributor arm of the distributor in contact with the No. 1 segment. The rotation of the distributor must also be noted, and as it is opposite that of the armature shaft, it is an easy matter to replace the secondary cables.

If the magneto is driven clockwise the distributor will rotate anti-clockwise. After replacing the instrument on its base, remove the distributor cover and rotate the shaft until the distributor arm is practically in contact with right segment looking at the distributor end. If the magneto is provided with an indicating window the work is simplified as it is only necessary rotate the armature shaft until the figure 1 appears in the indicating window as shown at A.

With firing order 1-3-4-2, the first cable is connected to the right terminal of the distributor and attached to the spark plug in the first cylinder. As the next cylinder to fire is the third, its spark plug is wired to the distributor terminal at the left of the first member or the second to be contacted by the distributor arm. The third contact to be made by the arm will be the terminal for the No. 4 cylinder. The second cylinder is fired last and its plug is wired to the fourth segment or terminal of the distributor block.

The wiring of the magneto and plugs will be greatly simplified if one remembers that the leads are connected to the distributor according to the firing order of the motor. An easy method is to connect the leads to the distributor terminals. Next take cable from the terminal segment with which the distributor arm is in contact and attach it to the plug of the first cylinder. With the distributor rotating anti-clockwise, the next cable at the left of the first one is carried to the third

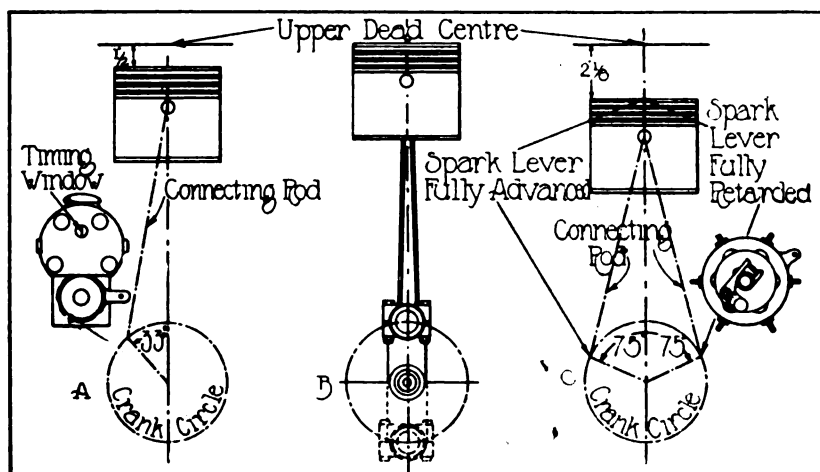
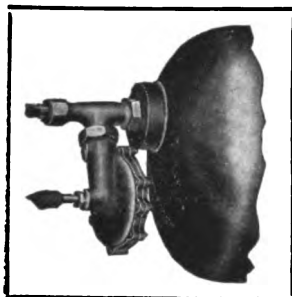


Fig. 2—Timing Diagrams, Showing Positions of Crank and Piston for Magneto Setting: A, Piston $\frac{1}{2}$ Inch Before Top Dead Centre, Corresponding to 33 Degrees Crank Circle; B, Piston at Top Dead Centre, or Completion of Compression Stroke; C, Timing with Battery, Commutator and Coil Ignition.

cylinder. The third cable is secured to the spark plug of the fourth cylinder, and the remaining wire, the No. 2, is connected to the second cylinder.

CARE AND MAINTENANCE OF GAS TANKS.

BECAUSE of the simplicity of acetylene light, users of the Prest-O-Lite tank do not always obtain that efficiency and economy possible with this system of illumination. When the proper size burners are used, the flame maintained at the correct height, the lamps set and focussed correctly and the supply line gas tight, an efficient, economical light is assured. These conditions may be obtained by the user without involving expense, and for the benefit of those not familiar with the proper operation of the Prest-O-Lite system the suggestions for its care and maintenance will be of value.



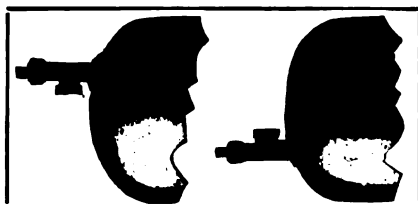
Prest-O-Lite Automatic Reducing Valve.

The Prest-O-Lite system consists of pure, clean acetylene stored and controlled in a seamless steel cylinder filled with asbestos discs. These discs are saturated with a liquid chemical which has the property of absorbing and dissolving acetylene, making possible the storing of a large quantity of gas in a small space.

Indicating Gauges.

One end of the cylinder is provided with a gauge, indicating the supply, and the three styles utilized are shown in an accompanying illustration. One registers the pressure in atmospheres (marked ATM), another pounds and the third both atmosphere and pounds. The pounds pressure of the atmosphere tank can be readily estimated by multiplying the pressure in atmosphere by 15, since the tanks are charged to a pressure of 225 pounds, approximately 15 atmospheres.

Some users of the Prest-O-Lite tank believe that some tanks are sent out not fully charged, especially in the winter time. This is incorrect, as the pressure varies according to the temperature. The cylinders are filled at 60 degrees Fahrenheit and in cold weather the gauge may show only 135 pounds (nine atmospheres) or less, which is lower than the word "full" on one style of gauge. During warm weather the pressure in a fresh cylinder may be as high as 315 pounds (21 atmospheres), causing the indicating hand to pass out of sight beyond the word "full." This leads some



Attaching Tank: At Left, Proper Method; at Right, Wrong Way.

to imagine that the tank is not fitted with a needle. The variation in the readings caused by different temperatures in no way affects the contents, which are determined by weight, not by volume. If desired, one may demonstrate this change in readings by taking a tank from a warm into a cold

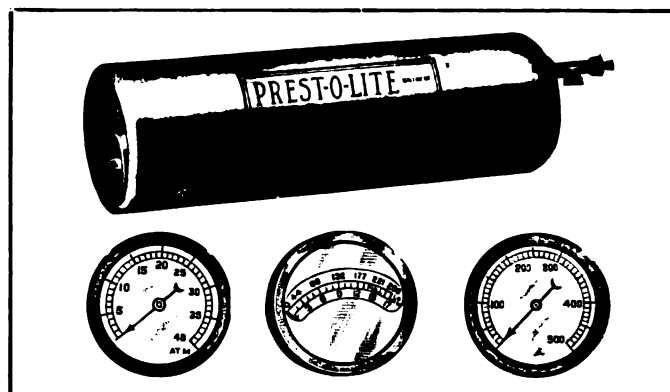
place or from a cold place into a warm.

Some users in installing a tank place the valve in the wrong position. It should be properly placed, as shown in an accompanying illustration, providing a free and unobstructed flow of gas. If improperly attached, as it has been seen by the writer on several cars, the liquid chemical in which the acetylene is dissolved may escape into the pipe line, checking the flow of gas and discoloring the flame.

Proper Mounting of Tank.

The Prest-O-Lite Company states that a tank should not be placed underneath the running board or frame, near the muffler or artificial heat, or mounted where it will chafe against metal, etc. Leaks should be guarded against, for minute leaks are largely responsible for inefficiency. When rubber tubing is employed it should be inspected from time to time, as it is affected by the elements, becoming hard and full of tiny cracks. Brass or copper tubing, unless rigidly mounted, will chafe.

If it be suspected that maximum service is not be-



Prest-O-Lite Gas Tank and Gauges: At Left, Indicating Atmospheres; Centre, Pounds and Atmosphere; Right, Pounds.

ing obtained from a tank, that is, it is not giving sufficient lighting hours, prepare a heavy soap suds and smear it all along the pipe lines, joints and connections. Any leaks will be noted easily by the bubbles given off. Never use a flame to detect a leak. The company markets an inexpensive special pipe-line tester, or its use may be obtained at any of the numerous service stations maintained.

Proper Flame.

The height of the flame is important. It should be as high as possible without blowing and as nearly level across its top as possible. The practise indulged in by some users of turning the flame down so low that the points do not meet is not recommended, as it tends to carbonize the burner openings, clogging them.

Frequently, gas is wasted by the use of too large a burner for a certain size of reflector, a tendency confined principally to the smaller sizes of lamps. The following guide will be found helpful:

With reflectors five inches in diameter and less, use 1/2-foot burners; with reflectors five to six inches in

diameter, use $\frac{5}{8}$ -foot burners; with reflectors six to $6\frac{1}{2}$ inches, use $\frac{3}{4}$ -foot burners; with reflectors $6\frac{1}{2}$ inches and larger, use $\frac{7}{8}$ -foot burners. In view of the many varieties of lamps, there is bound to be a slight variation, but the above will be decidedly useful in testing to find the correct size.

Focussing Lamps.

The proper focus and correct angle of a lamp are important. With the proper sized burner the flame and mirror lens should be properly located in relation to each other. To test the focus, hold a white sheet of paper three or four feet in front of the lamp. If the focus is correct a clear, white field of light will be obtained, and in addition, a clear, inverted picture of the burner and the flame will appear on the sheet. If, in making this test, a round or crescent shaped dark spot should appear in the field of light, the lamp is out of focus, and the burner or mirror should be moved backward or forward, as needed, until these dark spots disappear.

Proper Angle.

The proper angle of a lamp is important. The face of the lamp should be perpendicular, and if tilted up, the light goes too far in advance of the car. If tilted down, the rays strike too near the machine. The position of the lights is easily tested with a plumb line (a string with a little weight attached), to see if the face is perpendicular.

In some instances where the lights are mounted unusually high, lamps will have to be tilted slightly downward, and in all installations the principal beam of light should strike the ground about 30 feet ahead of the car. The adjustment recommended by the company is obtained by directing the right lamp very slightly to the right and the left lamp to the left. A straight-edged board extended across the face of both lamps will serve as a guide, and the inner edge of each lamp should be brought forward about $\frac{1}{4}$ -inch further than the outer edge. This will obtain a diffusing beam, lighting the side of the road. If it is necessary to bend the lamp brackets, two wrenches should be employed, one holding while the other is utilized to do the twisting, etc.

Economy of Gas.

Users of the gas tank are cautioned against opening the valve too wide when lighting the lamps. The valve should be turned slowly with the key, and the flame should never hiss or tremble when the match is applied. Too high a flame spells waste of gas and in addition a mirror is likely to become damaged.

These troubles may be overcome by fitting a Prest-O-Lite automatic reducing valve, which automatically regulates the supply. The valve is easily attached, inexpensive and provides the correct pressure at all times, whether the tank be full or nearly empty. With this valve one person can turn on the gas and light the lamps with a minimum of effort, and economy is also obtained. If acetylene side and tail lights are desired, the reducing valve will control the supply to these members.

GMC RECORD SALES.

The month of April, 1914, was reported to have been the banner month in the history of the General Motors Truck Company, Pontiac, Mich., both in number of sales made and number of trucks shipped. This, however, was broken in May, for during that month 11 per cent. more machines were shipped and an increase of 17 per cent. was shown in sales. In June the May record was broken by an increase of five per cent. in shipments and of nine per cent. in sales.

Just how much last year's records were exceeded has not been made public as yet, but it is stated that the increase in sales for April, 1914, over that month of 1913 was 20 per cent., and 36 per cent. and 17 per cent. respectively for May and June, 1914.

RECEIVER FOR TIRE COMPANY.

Edward S. Delaplane has been appointed receiver of the St. Louis Tire & Rubber Company, St. Louis, Mo., as the result of a suit filed by 13 stockholders of the company asking for a receiver. The complainants claim the reason for the failure of the company is inability to get the money subscribed for the capital stock, which is \$150,000, only \$74,200 having been paid in.

The concern was organized 18 months ago for the manufacture of solid and pneumatic motor car and vehicle tires. According to J. A. Swinehart, one of the promoters of the company, an agreement to wind up the business of the concern was made at a recent meeting.

PACKARD TRUCK SALES.

The Packard Motor Car Company's sales of Packard trucks totalled \$825,394 for the month of June, exclusive of bodies. This is an increase of \$256,994 compared with June, 1913. In March the Packard Company sold more than \$750,000 worth of trucks. In April the business total was 60 per cent. greater than in April, 1913, while the May total was also 60 per cent. greater than in the corresponding month of the previous year.

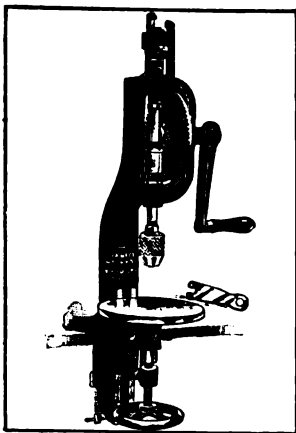
The Ball & Roller Bearing Company has been incorporated by Lewis R. Heim, J. Henry Roth and William C. Barrett, at Danbury, Conn., with capital of \$100,000, to engage in the production of ball and roller bearings.

The Firestone Tire & Rubber Company, Akron, O., has installed an industrial library for the benefit of its employees, this service extending to its branches and agencies.

The capital stock of the Thermoid Rubber Company, Trenton, N. J., has been increased to \$750,000.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE North Bros' Manufacturing Company, Philadelphia, is producing what is termed the Yankee bench drill, which was designed for small repair shops



No. 1003 Yankee Drill.

whose capital is limited as well as some concerns starting in business. Two types are produced, the No. 1003 being shown in an accompanying illustration.

It is made with one speed only, and being geared 49:14, one turn of the crank gives $3\frac{1}{2}$ revolutions to the spindle. The latter is of steel, $\frac{3}{8}$ inch diameter, and all gears have teeth of extra strength. They are cut from solid stock and run

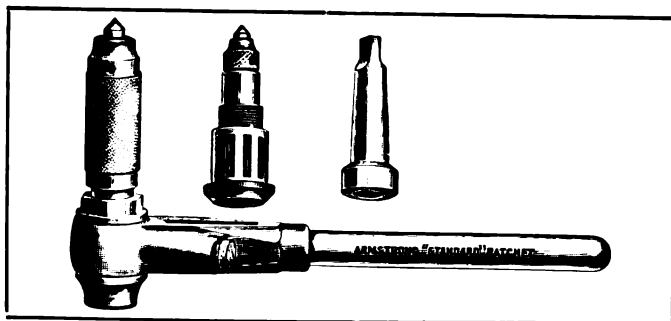
smoothly and accurately. The pinion is of steel.

A small lever on the arm to the left of the spindle locks it fast to open and close chuck. The chuck is of steel, $1\frac{1}{4}$ inches long, one inch in diameter, and has three jaws of hardened tool steel. It is nickel plated and polished, and holds round shank drills up to $1\frac{1}{4}$ diameter inclusive.

The traverse of spindle (automatic feed) is $1\frac{1}{2}$ inches. The friction feed brings to and from the work quickly and the ratchet feeds automatically all drills from No. 54 to $\frac{1}{4}$ inch without danger of breaking. The frame is finished in dead black. It comes neatly packed in a wooden box and the gross weight is 20 pounds. The No. 1005 drill is the same as the one described, but is made stronger, being designed for heavier work. Complete details and prices will be supplied upon request.

ARMSTRONG RATCHET DRILL.

The Armstrong Bros. Tool Company, 357 North Francisco avenue, Chicago, Ill., is marketing a line of ratchet drills, one of which, the Standard combination, is shown in an accompanying illustration. The



Armstrong Standard Combination Ratchet Drill.

tool is designed for general service and for drilling or countersinking holes in material not easily accessible with ordinary tools.

The combination includes a sleeve ratchet for Morse taper shank drills, a square taper socket to fit the same and a short spindle with feed screw by which the ratchet can be converted to use square taper shank drills.

A quality of the Armstrong ratchets is that all parts are hardened. The Standard ratchet combination is made in five styles. The lengths are from nine to 22 inches. The company issues a complete catalogue, giving details and prices of its product, which will be supplied free upon request.

HERCULES PORTABLE CRANE.

William Shelton Nicholls, Hoosick Falls, N. Y., is manufacturing the Hercules portable crane hoist shown in the accompanying illustration and it is designed for service in the factory, garage and service station. It may be utilized in repairing a nd for a number of other purposes, saving time and labor. A feature of the Hercules is that it is constructed of steel throughout and has solid frame pieces, top to bottom. The base or bed is low, permitting of its use from all sides of the automobile. As



Hercules Portable Crane, Having Extra Length Overhang and Extension for Handles.

by the illustration, an extra length overhang brings the centre of lift or hoist directly over the motor. The wheels have a wide face and are mounted on roller bearings of ample size.

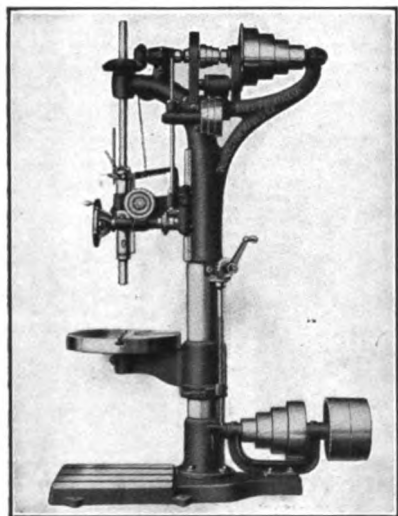
An extension piece for the crank handles, extending these out beyond the mud guards, is standard equipment. The Hercules is made in 1000, 2000 and 3000 pounds capacity and is moved easily about the building. The height overall is eight feet and the hoist has a capacity of six feet, 10 inches, sufficient to meet varied requirements.

PRENTICE DRILLING MACHINE.

The Reed-Prentice Company, Worcester, Mass., maker of lathes for motor cars and general work and

drills, is manufacturing the Prentice 20-inch upright drilling machine, shown in the accompanying illustration. It is of the sliding head type, is equipped with back gears, and with a combined belt and worm driven power feed. This power feed may be disengaged automatically by means of an adjustable stop on the spindle quill tripping a mechanism and allowing the driving worm to drop out of mesh.

Both the spindle and the head are counterbalanced by the same weight, and the sensitiveness of the counterbalance may be varied to suit the case by merely moving the chain along the notched lever. The sliding head is securely gibbed to a wide way on the column and is stated to be very rigid when drilling. Crucible steel is used in the construction of the spindle, which is provided with a ball thrust bearing. It is possible to drill to any point on the surface of the table which, in addition to swinging around the column, may be rotated about its own centre. The base is of ample proportions and the column is rigidly bolted to it.



Prentice Upright Drilling Machine.

The specifications are as follows: Distance from column to spindle centre, 10 inches; maximum distance from spindle to base, 48 inches; maximum distance from spindle to table, 30 inches; vertical traverse of table, 21 inches; vertical traverse of head, 12 inches; vertical traverse of spindle, $7\frac{1}{2}$ inches; hole in spindle, Morse taper No. 3; largest cone diameter, nine inches; diameter of spindle, $1\frac{3}{8}$ inches; diameter of table, 16 inches; driving pulley dimensions, nine by $2\frac{3}{4}$ inches; speed of bottom shaft, 240 revolutions a minute; total height of machine, 76 inches; floor space, 44 by 18 inches; width of cone belt, $2\frac{1}{4}$ inches; cubic feet, 38.

HARRINGTON CHAIN HOIST.

Hand operated chain hoists, because of the ease of operation and general utility, are standard equipment in large repair shops and service stations. Edwin Harrington & Co., Inc., 17th and Callowhill streets, Philadelphia, manufactures a wide variety of chain hoists, one of which, the improved screw hoist, is shown in an accompanying illustration.

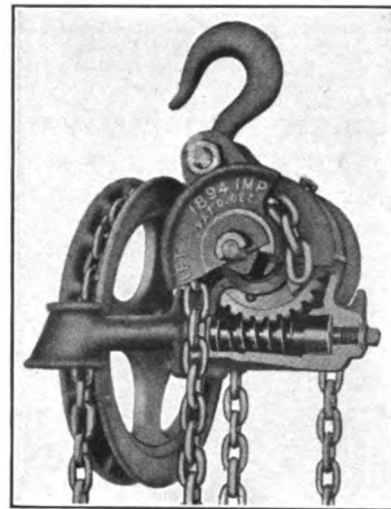
It is designed to withstand severe service, and each component is subjected to rigid inspection before assembly. Each link of the chain is carefully tested.

The worm gear, formerly of iron, is now made of

bronze with square hubs, and is driven by a steel worm. The load wheels have square holes fitting squared hubs on the worm gear instead of clutches, increasing the strength and avoiding the liability of breaking. They are also reversible.

The load is carried on two distinct chains, either of which is capable of lifting a load up to the full rated capacity of the hoist, thereby reducing opportunity of accident to the minimum. The load chain hook has a swivel connection, so that any twist of the chain may be straightened out without removal. A thrust screw and bronze washer at the end of the worm is instantly adjustable for obtaining fast or slow speed in lowering.

A hand chain guard is so placed that the operator can stand clear of the load without wasting time in dragging the chain in the guard. The hoists are made in capacities ranging from 500 to 30,000 pounds, and having lifts of from eight to 12 feet, respectively. The company issues a complete illustrated catalogue on its product, which will be mailed free upon request.

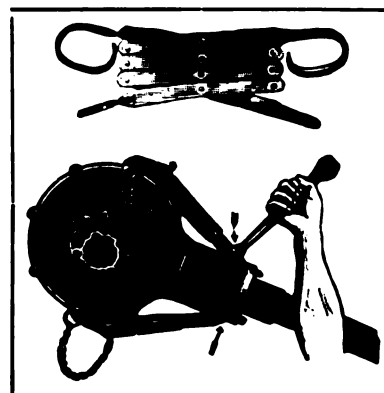


Harrington Improved Screw Hoist.

FORD HOUSING PULLER.

The Universal Manufacturing Company, Racine, Wis., is marketing a practical tool for garages, repair shops and service stations handling Ford commercial cars. As may be noted in the accompanying illustration, the tool is designed to remove the propeller shaft housing from the differential. One of the qualities of the tool is that the housing can be removed without injuring its flanges. It is also stated that the device saves considerable time over the usual method of driving with a hammer. The Universal Ford housing puller is sold in sets of two and for a moderate price.

The company also markets extension pliers for reaching and removing nuts, bolts, etc., from places not easily accessible by the hands or with ordinary tools. With the Universal pliers the workman can

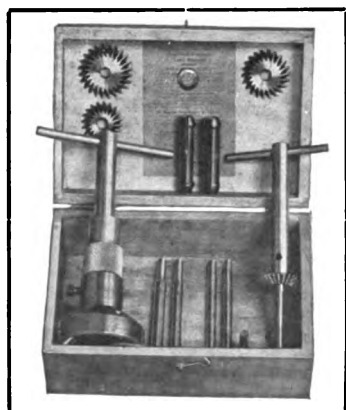


Universal Ford Housing Puller and Extension Pliers.

reach into the pan, transmission, etc. The pliers can be extended 21 inches, and when folded as shown in the illustration is seven inches long and about three inches wide. The maker states that this tool will save its cost in a brief period of service. It is also practical for the motorist who maintains his own car.

NEW FOSNACHT VALVE RESEATER.

H. G. Paro, 30 Michigan boulevard, Chicago, announces that the Fosnacht valve reseater has been

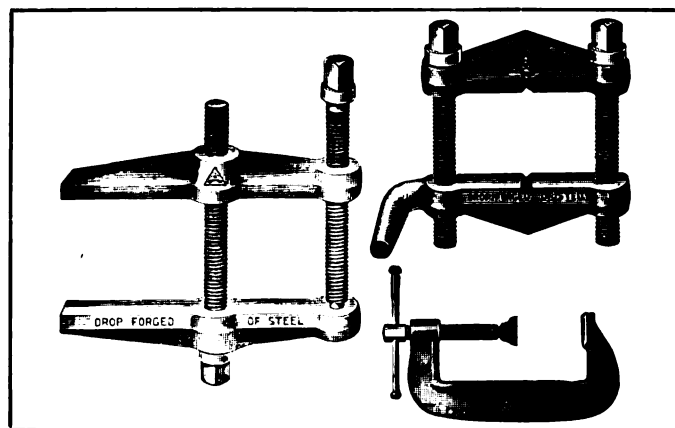


The New Fosnacht Valve Reseater.

much improved and that the new model is sold with the same guarantee of accuracy and durability as was the original model. The Fosnacht is now supplied with two universal chucks that are adaptable to any size valve stem from 5-16 to $\frac{1}{2}$ inch inclusive. Four improved reamers are also included in the equipment, these being for valves of from $1\frac{1}{2}$ to $2\frac{3}{8}$ inches. Special size reamers are supplied at order. The tools are packed in a neat hardwood box. The efficiency and serviceability of the Fosnacht valve reseating equipment is well known to the trade.

LATHE DOGS AND CLAMPS.

The Armstrong Bros. Tool Company, Chicago, Ill., has issued a new catalogue of drop forged lathe dogs and machinists' clamps, three types of which are shown in the accompanying illustration. One quality of the clamp lathe dogs is that the under face of the screw heads is convex, fitting into a concave seat, and as the holes in the upper bar are larger than the screw, this allows considerable tilting without bending the screw. The dogs are produced in four



Armstrong Machinists' Clamp, Lathe Dog and C Clamp.

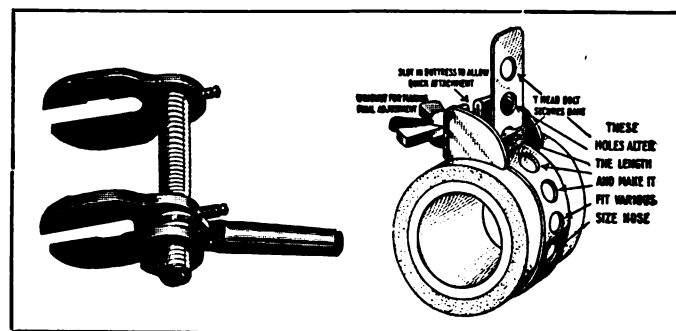
sizes, ranging from $1\frac{1}{4}$ to $3\frac{1}{2}$ inches between the screws.

The machinists' clamps are produced in four sizes

with openings from $1\frac{1}{4}$ to $4\frac{1}{4}$ inches. All parts are hardened and the faces are ground true. The under face of the centre screw is convex, fitting into a concave seat to allow tilting. The jaws are extra heavy and the maker states they will not bend or spring on a short bite. The C clamp is adapted to a large variety of work. It is produced with capacities of from two to 18 inches adapted for heavy work.

MORGAN HOSE CLAMP.

The Morgan Manufacturing Company, Newport, R. I., is marketing a hose clamp which presents several practical features, the most noticeable of which is that it will fit any intermediate size of pipe within its capacity. As shown by the accompanying illustration, it includes a flat band and buttress, and a slot in the latter permits of quick attachment. The band is secured by a T head bolt carrying a wing nut, and one of the qualities of the design is that no tools are necessary to adjust the clamp. As will be noted by the drawing, the band is provided with several holes for the purpose of fitting different sized hose. The type 10 is constructed of stamped brass with nut of simi-



Morgan Utility Tool and Hose Clamp.

lar material, and the steel screw has a fine thread. The clamps come in different sizes and are inexpensive.

The Morgan utility tool, as the name implies, is designed for a number of useful purposes, among which is that of a valve spring lifter. When thus used it can be locked to hold a load in either direction. The tool can also be employed as a clamp, drill jig, hand vise, spring compressor or stretcher, patch holder, etc. It is constructed of a very tough steel and will withstand severe service. It comes in different finishes and complete details of the uses to which it may be put, as well as prices, will be forwarded upon request. It is marketed by the Morgan Manufacturing Company, Newport, R. I.

Thomas J. Wetzel, formerly with the Spicer Manufacturing Company, Plainfield, N. J., is now with the Sterling Metal Products Company, Lancaster, Penn.

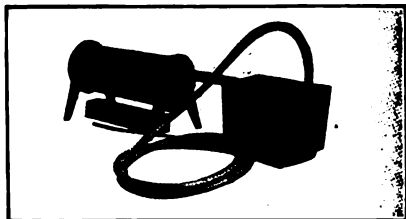
H. R. Curtis has been appointed manager of the Boston branch of the Splitdori Electrical Company, Newark, N. J.

NEW COMMERCIAL CAR ACCESSORIES.

PROGRESSIVE DECARBONIZER.

Employs Oxygen and Includes Rechargeable Generator.

The Progressive Manufacturing Company, Reading, Penn., is introducing a popular priced oxygen carbon removing



equipment which is designed for the small garage and repair shop. It consists of an oxygen generator, which is held to be easily operated and which may be utilized indefinitely when refilled with the proper dry chemicals.

One of the qualities of the equipment is stated to be the use of non-poisonous material. Another feature is that the gas is always at low pressure, which eliminates the need of reducing valves. The outfit comes complete with sufficient material for cleaning a large motor, and the usual flexible hose is provided. Extra charges may be obtained at a nominal cost. The principle is similar to the conventional decarbonizing equipment. It is moderately priced.

DUNKLEY COMPRESSOR.

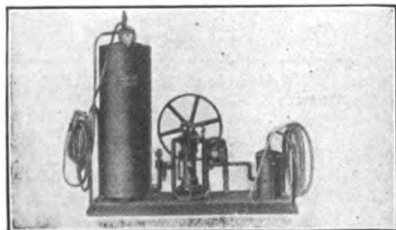
Combines Power Pump, Motor Cleaner and Vacuum Cleaner.

The Dunkley Company, Kalamazoo, Mich., is manufacturing an equipment for the private as well as public garage, which combines the functions of a high grade air compressor, a vacuum cleaner and a motor cleaner, all mounted on one base.

The compressor is designed to be driven either by a belt or by an electric motor, provision being made for the installation of the last named unit. The compressor proper is of the double acting, water-cooled type and is a high pressure design. The tank has a capacity of 80 gallons and is provided with a gauge, suitable length of high grade flexible hose and connections. A lamp socket is provided with the electric unit.

Mounted on the same base is the motor cleaning attachment. It comprises a fuel tank and a two-way nozzle, which has passages for the air and gasoline, which breaks the liquid up into a very fine spray. Being projected under considerable pressure, the atomized fuel will reach and clean places not easily accessible by the usual methods. It is stated that heavy deposits of grease and oil may be displaced readily and that the surface is left very clean.

The vacuum cleaner is obtained by utilizing the intake of the compressor, a vacuum tank and dust collector being provided. This permits of utilizing the equipment for removing dust from tufted cushions, tops and places difficult of access with ordinary members.

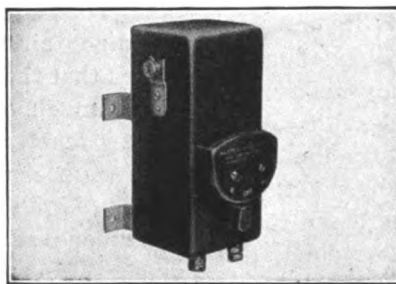


BROWN MASTER VIBRATOR.

New Design for Model T Ford Motor Held to Be Very Efficient.

The Brown Company, Syracuse, N. Y., is manufacturing a new type of master vibrator for the model T Ford motor, and one of its qualities is the purely mechanical adjustment employed. It is stated that it is so simple that a novice may adjust it without trouble and in a very short time. It is also stated that when once set it will require no attention, as the adjustment is permanent.

Another feature is the use of non-sticking contact points. This is obtained by the method of separation, a sharp blow action being utilized instead of their being drawn apart. They are constructed of a specially hardened material. The vibrator is mounted in a mahogany dash case equipped with a substantial kick switch and can be attached to the dash between the regu-



lar coil and the source of current supply. A Puritan switch is utilized, the design being thief proof, as the lever or handle may be displaced. The advantages of a master vibrator are well known. The new design is constructed of high grade material and the workmanship is maintained to be first class in every respect.

NO-SPILL BATTERY.

Electrolyte Is Stated to Be Non-Freezing and Non-Spilling.

The Premier Electric Company, 4031 Ravenswood avenue, Chicago, maker of the Hi-Lo horn, etc., is introducing a storage battery which may be utilized for ignition, lighting, operating a horn, etc.

The electrolyte is stated to be non-



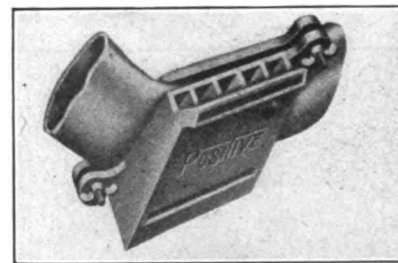
freezing, as well as non-spilling, special emphasis being laid upon this feature, which makes for convenience when handling the cell and cleanliness of the battery compartment. The efficiency of the battery is stated to be equal to conventional types.

The case containing the cells is finished with rubberoid paint and is supplied with antimony binding posts, which are held to be non-corroding. The No-Spill storage battery comes in six-volt, 60 ampere-hour and 80 ampere-hour capacities and is moderately priced.

NEW STEAM VULCANIZER.

Positive Supply Company Now Manufacturing Small Portable Vulcanizers.

The Positive Supply Company, Davenport, Iowa, manufacturer of portable steam vulcanizers and kerosene garage



heaters, is now producing a steam tire vulcanizer for use in private garages and small repair shops. It is stated that this equipment is the only one made expressly for repairing tire tubes that utilizes steam for vulcanizing.

The maker states that the outfit can be carried in the tool box of an automobile. It consists of a metal body, with one compartment for water and another for fuel. The water section is between the tube and the flame, where it equalizes the heat generated. A tube is vulcanized, says the manufacturer, so that the patch becomes a part of the tube without danger of burning or scorching. It can be mounted on any bench or post. The weight is three pounds. A surface of 12 square inches can be vulcanized with one setting. Complete instructions accompany each vulcanizer which is constructed of the same high grade material for which the products of the concern are noted. The new design is moderately priced, and details will be supplied upon request.

GRESSER SHOCK ABSORBER.

Coil Springs Utilized and Device Acts in Both Directions.

The Buckeye Suspension Company, Cleveland, O., is manufacturing the Gresser shock absorber, which resembles those employing the friction principle, but the shock absorbing action is obtained by two coil springs. One of these is secured to one arm of the device and the second to the other member in such manner that the absorber acts in both directions. The special feature claimed for the device is that a limited amount of spring movement is permitted without the absorber being actuated, but with large oscillations of the springs the movements are controlled.

This is explained by the fact that with seven or eight-inch leverage the outer coils of these springs will offer practically no resistance when wound at an angle of 12½ degrees. With this leverage approximately 1½ inches play above the normal position is allowed, or three inches in all. The Gresser shock absorber is adaptable to all types of motor vehicles. Information sent on request.



CORRESPONDENCE WITH THE READER.

Connecticut Magneto—J. W. S., Brooklyn, N. Y.

Will you please advise me as to the correct gap of the Connecticut magneto and spark plug gap?

The gap or break of the platinum contact points of the Connecticut magneto is determined by the use of a file gauge supplied with each instrument. This

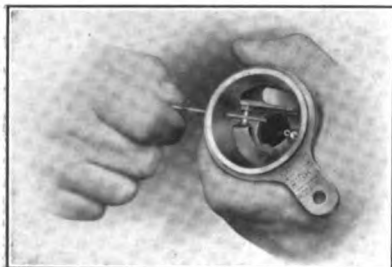


Fig. 1—Using File Gauge to Set Contact Points.

gauge may be obtained by addressing the Connecticut Telephone & Electric Company, Inc., Meriden, Conn., if one cannot be obtained at a supply house. The manner of using this gauge is shown at Fig. 1. As may be noted, the breaker box housing is removable, and is provided with a slot through which the gauge is inserted. By loosening the adjusting nut on the fixed platinum point, and moving the latter, the gap may be decreased or increased as required. This work should be done after the points have been cleaned. The locking nut should always be tightened after making any alteration of the gap.

In trueing the platinum points care should be taken not to remove too much of the metal as the material is expensive.

Adjusting Carburetor—Reader, Milton, Mass.

We have a converted pleasure vehicle fitted with a model L Schebler carburetor which I took down to clean. After assembling it I cannot get good results. How is this type set to obtain good mileage without losing power?

The model carburetor referred to is shown at Fig. 2 with the components used in adjusting lettered. To adjust this carburetor the low speed needle is screwed in until it seats firmly. Do not set it up too hard. Next, unscrew it about a turn and a half, and prime or flood the carburetor. Open the throttle slightly, and with the spark retarded, start the motor. Screw in or out the low speed needle valve until the motor runs smoothly. If it be found that it operates too fast, move out the adjusting screw, which restricts the opening of the butterfly valve. If the engine stops when the throttle is fully closed, move the screw in. This screw is utilized to regulate the supply of mixture, not the quality.

The low speed member must not be disturbed in making the adjustment of the intermediate and high speeds. These are obtained by moving the arms or pointers on the dials, of which there are two. The intermediate speed is adjusted first and has three numbers, 1, 2, 3. Move the arm or pointer about half way from the figure 1 toward the figure 3. Next advance the spark and open the throttle, so that the roller

moving with the track like member beneath the dials is in line with the intermediate speed dial. It is important that care be taken to see that the auxiliary air valve seats lightly.

If the motor back fires with the spark and throttle in this position, increase the supply of fuel by moving the arm toward the figure 3, or if the mixture be too rich, back towards the figure 1. A little experimentation will determine the best position. Noting the color and odor of the exhaust also will be of value. If the odor be pungent, it indicates too much fuel. The mixture should smell what is termed "sweet." If the color of the exhaust can be noted, it will be of material assistance. A blue flame indicates too much gasoline for power; a purple flame shows that the best proportions are reached. If the flame is yellow, too much air is present in the mixture. A red color shows that the gasoline is of poor quality or that there is too much oil in the combustion chamber. White smoke denotes too much oil and black smoke an excessively rich mixture.

The high speed adjustment is secured by utilizing the other pointer and dial, and with the throttle wide open. The maker of the Schebler carburetor recommends cutting down the supply of fuel until the motor shows signs of back firing, then increasing the amount until the engine runs smoothly and evenly. Turn the low speed member a notch at a time and note the results. In adjusting the arms do not move these more than half way at a time between the graduated divisions or marks. Slight variations may be necessary in setting the speeds as, frequently, apparent proper operation with the motor idle will not obtain the desired results under load.

If, after adjusting, and especially at low speeds, it be found that the motor will not run smoothly and evenly, it is advisable to search for leakage of air around the intake pipe connections. Frequently extra

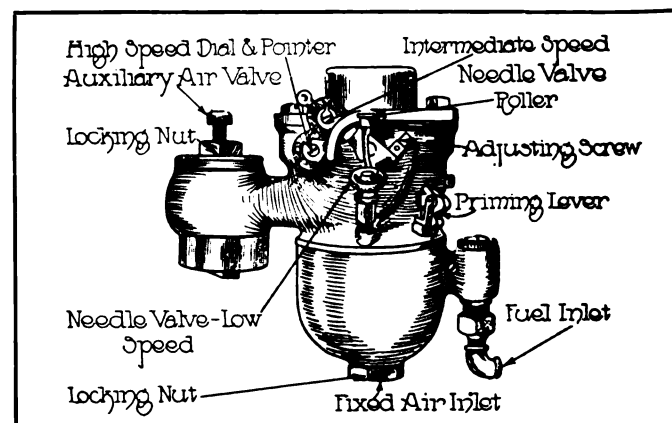


Fig. 2—Components Utilized in Adjusting Model L Schebler Carburetor.

air is admitted because of leaky connections, weakening the mixture at low speeds, and making it too rich at higher speeds.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXIV---Construction and Operation of Splitdorf Magnetos Providing Dual Ignition on One Set of Spark Plugs and Employing a Transformer Coil to Build Up the Low-Tension Current--Features of EU4 Instrument.

(By C. P. Shattuck.)

MANUFACTURERS of magnetos incorporate changes in their product from time to time, but the improvements are generally in the nature of refinements. It is the exception, rather than the rule, that the principles or general construction are altered, and the improvements noted recently have been more towards making those components of the breaker box interchangeable throughout, and protecting parts affected by moisture and foreign elements. Generally the alterations made in a standard model are to meet the requirements of automobile engineers. As a result the modern magneto is very compact, highly efficient and easily maintained.

Splitdorf Types.

The Splitdorf Electrical Company, Newark, N. J., one of the earliest concerns to manufacture ignition apparatus, produces a number of models for internal combustion engines, and one type was discussed in a previous installment. The company employs letters to distinguish its product and, while it has discontinued the manufacture of some of the older types, these may be obtained upon order. Among these are the B, D and F, four-cylinder types, the last two named differing only from the B in the number of magnets utilized.

Splitdorf Model B.

The Splitdorf model B was a popular type and thousands of these are giving satisfaction today. Although supplied on order, users of the older forms of instruments may obtain parts promptly at the service stations, or direct from the factory. A description of the model B instrument will serve to acquaint the reader with the details of construction and operation of the earlier and more modern types, as the principles are similar.

With the exception of the EU4 magneto, which will be dealt with later, all Splitdorf instruments are productive of a low-tension current obtained by the utilization of a single winding of coarse (primary) wire. The armature carrying the winding rotates between the pole shoes or cradle, attached to which are the permanent horseshoe magnets. The electricity generated, however, will not have sufficient energy to bridge gap at electrodes of spark plug, and to obtain sufficient pressure, a transformer coil is utilized, it differing from the conventional induction coil in that the usual vibrator producing a series of spark is eliminated. The Splitdorf coil is, therefore, of the non-

vibrating type and, as may be noted by the wiring plan shown at Fig. 157, both leads from the dry cells are attached to the coil, neither being grounded as generally is the case with the vibrating type of coil.

Circuit Breaker.

As is true of all high-tension ignition systems, the primary current must be interrupted to induce the secondary. In the Splitdorf magneto this is performed by the circuit breaker mechanism, views of which are shown at Figs. 153 and 154. As will be noted, the armature shaft carries a two-point cam, which breaks the contact maintained between the platinum points twice every revolution that is made by the armature shaft. As shown, the points are together.

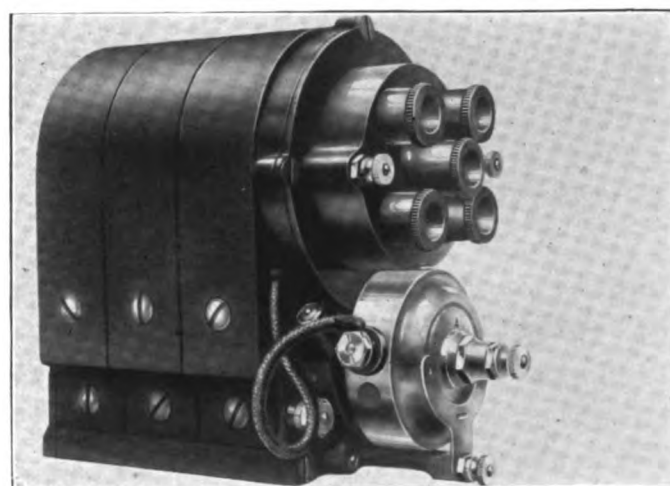


Fig. 152—Splitdorf Model B Magneto, Generating a Low-Tension Current Which Is Transformed into High-Tension by a Non-Vibrating Coil.

Upon the points separating the primary current is transformed into one of considerable voltage by the coil, which is in circuit with the magneto, as indicated by the wiring plan at Fig. 157. The current generated by the rotation of the armature in the magnetic field, is collected by two brushes, shown in the cover at Fig. 154, and passes to the primary winding of the transformer coil. Upon the primary circuit being interrupted by the action of the circuit breaker mechanism, a high-tension current is induced in the secondary winding, as previously explained.

Secondary Current.

The path of the secondary current is easily traced. By referring once more to Fig. 157 B, it will be seen that the high-tension current flows from the coil through the wire D to the centre terminal of the dis-

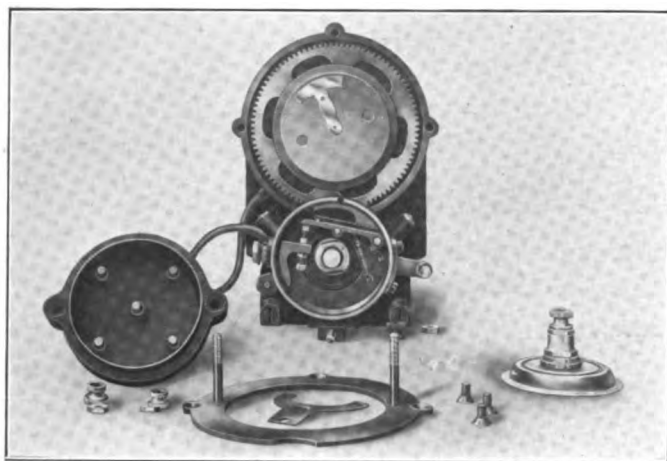


Fig. 153—Showing the Splitdorf Magneto with Distributor Block, Breaker Box Cover and Housing Removed.

tributor. Contact between the distributor arm and this terminal is by a brush. The distribution of the electricity to the spark plugs is made by the arm contacting with the carbon brushes in the distributor cover shown at Fig. 153.

Dual Ignition.

One of the desirable qualities of the Splitdorf magneto is that it provides dual ignition with one set of spark plugs. This is obtained by utilizing a set of dry cells or a storage battery of proper voltage as a source of current supply, and employing the circuit breaker mechanism to interrupt the electricity, which is low-tension, or a primary current. The current from the cells is led to the coil at terminals B B and the circuit is completed with the lead 3 (ground) and the lead (2) (interrupter). Upon the circuit being interrupted by the contact points separating, a high-tension current is induced in the transformer coil and flows to the distributor by the cable D. The dry cells are utilized for starting or for an emergency.

Types of Coils.

In addition to the dash type of coil shown at Fig. 157, the Splitdorf Electrical Company produces the

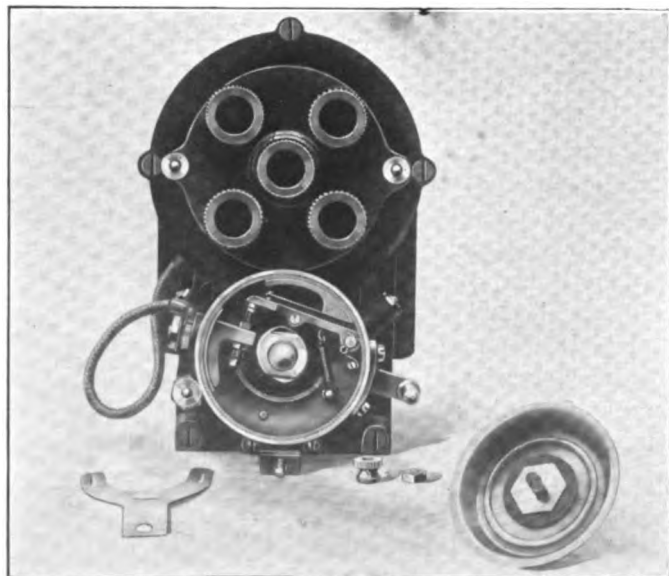


Fig. 154—Splitdorf Magneto with Circuit Breaker Cover Displaced to Show the Brushes Utilized to Collect the Primary Current.

tube transformer, which is utilized when a clean dash is desired. Later the company brought out the "TS" transformer, which is tubular in form and is set through the dashboard and retained by a flange forming the base of the switch. A similar design, known as the "TSA", is utilized with the late model A magneto.

Changing Drive.

A quality of the Splitdorf magneto is that the direction of drive may be changed by one familiar with the instrument. This is a decided advantage, as it enables the use of the magneto on machines other than originally installed. The work is not complicated and the directions of the maker are easily followed.

Assuming that it be desired to change the direction of drive: The first step is to displace the circuit breaker box, then hold the driven end of the armature shaft firmly with a pair of gas pliers. Next remove the hexagonal nut and displace the cam, which is retained by a Woodruff key. Turn the cam over and replace it on the shaft with a prick punch so that it will not jar off.

Remove the distributor block, also the insulated

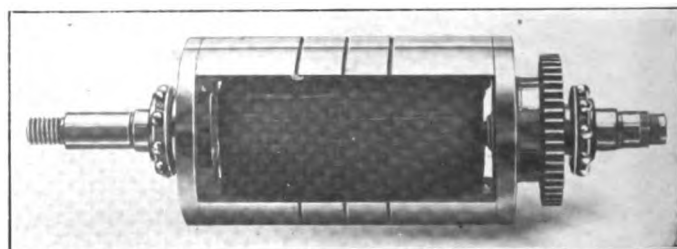


Fig. 155—The Splitdorf Armature Carries a Single Winding of Primary Wire and Rotates on Ball Bearings.

brush that is located at the driving end of the back plate of the magneto, taking out the four screws retaining the same, and displace the plate. The armature can then be slid backward, unmeshing the distributor and armature shaft gears. The armature gear is next remeshed so that the position of the segment will agree with either A or C, Fig. 157, according to the direction of rotation desired.

As will be seen by the drawing at C, which depicts a left hand magneto looking at the driving end, the contact points are about to separate and the driving (armature) gear should be so meshed with the driven (distributor) gear that when the armature core leaves the pole piece there is a distance of 1/16 inch between these members. The segment will be just under the brush. The position of the segment, armature core, etc., for a right hand magneto, is shown at A. In performing this work it should be borne in mind that the distributor arm rotates in a direction opposite to that of the armature shaft. For example: If the shaft rotates clockwise, looking at the driven end, the distributor member will revolve anti-clockwise. As the work of changing the mesh of the gears is performed at the opposite end of the instrument, it is well to remember that a shaft of a magneto rotating clockwise will be revolving anti-clockwise when viewed

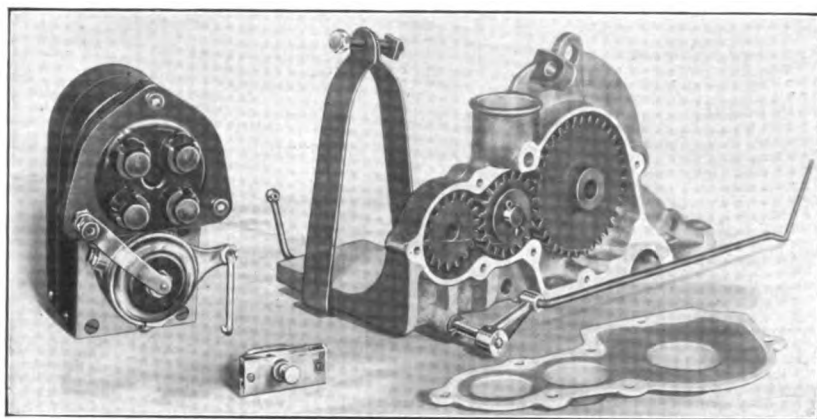


Fig. 156—The Splitdorf EU4 Magneto, a True High-Tension, Water and Dust Proof Instrument—It is Shown with the Attachments for Installing on Model T Ford Motor—It is Also Adaptable to Motors up to and Including 30 Horsepower.

from the breaker box end. A little study will make clear the point involved. It may be demonstrated by twirling a pencil, having a rubber, clockwise with the point towards one. If the direction of rotation be continued and the pencil turned around, the rubber end will be revolving anti-clockwise.

Splitdorf EU4 Magneto.

Although the Splitdorf Electrical Company has specialized in magnetos having but a single winding, the demand of its customers for a true high-tension instrument, resulted in the EU4, which is shown at Fig. 156. It should be explained that the illustration also depicts the attachment for the model T Ford machine, which is used for commercial as well as pleasure purposes. The new instrument is water and dust proof and is constructed throughout on a principle of strict utility combined with a neat appearance, and has sufficient energy for a 30-horsepower high-speed motor.

The design embodies an aluminum base to which the pole pieces are secured, and between the latter revolves the armature on two annular ball bearings. The armature, after being wound, is impregnated with a heat and oil proof compound, which is held to make it practically indestructible. Mounted over the armature is the condenser, this being clamped between two metal plates, which are secured to the pole pieces. The

function of a condenser has already been explained.

New Breaker Mechanism.

The magnets are of the best grade tungsten steel, and straddle the pole pieces. Water, dust and oil proof qualities are obtained by fitting a cover plate over the end plates, as shown. The circuit breaker differs from Splitdorf practise in that it is attached to the armature shaft and revolves with it. Owing to centrifugal action, the platinum contact points come together in a positive manner at high speeds, thus permitting the utilization of a spring with light tension, a construction

reducing wear of the cam to a minimum. These and other similar refinements are stated to be the subject of patents and exclusive Splitdorf features. The break in the primary circuit is obtained by a roller coming in contact with a steel cam, separating the platinum points.

Indicating Window.

The high-tension winding on the armature is connected to a collector ring or segment, imbedded in a spool mounted on the driving end of the armature shaft. From the brass segment a carbon brush leads the current through a water proof brush holder, having a detachable plug, to which the cable leading to the spark plug is connected. An indicating window in the distributor block makes for ease in timing.

As is true of all true high-tension magnetos, the Splitdorf EU4 eliminates all but the spark plug cables and a wire connecting the instrument to the switch and ground, a simple arrangement.

The cam holder may be shifted to the extent of 23 degrees, enabling a liberal advance or retard of the spark in timing. Qualities of the EU4 magneto emphasized are: A hot spark at all motor speeds, easy starting of the engine, water and dust proof construction and accessibility of components if requiring attention after considerable service.

(To Be Continued.)

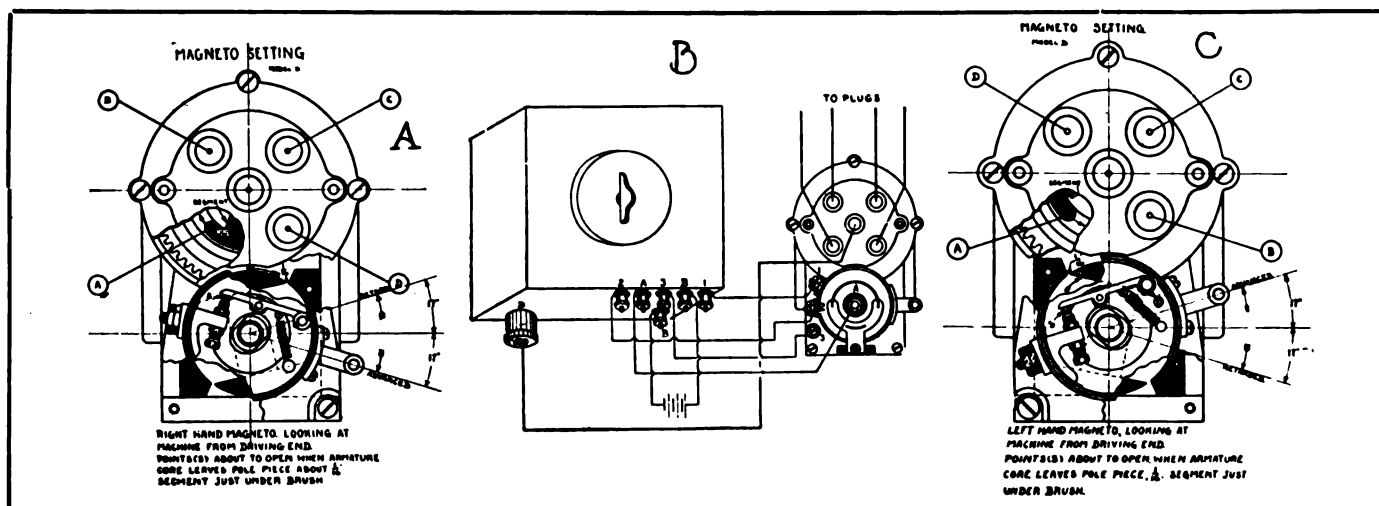


Fig. 157—Wiring Diagram of Model B Splitdorf Magneto and Proper Position of Armature for Setting for Both Right and Left Hand Drive, Viewing the Instrument from Its Driving End.

BOSCH-RUSHMORE MERGE.

Concern Produces Every Type of Electric Equipment for Vehicles.

The Bosch Magneto Company of New York City has purchased the plant and business of the Rushmore Dynamo Works, Plainfield, N. J., and it will be operated in the name of the Bosch Magneto Company, but as the Rushmore department, and the products will be known as Bosch-Rushmore in the trade. The Bosch Magneto Company has for several years been a very important factor in the industry producing electric specialties for motor vehicle equipment, but manufacturing ignition instruments and systems exclusively. With the development of electric lighting and engine starting devices, the obvious advantage of a company producing every form of electrical system or instrument for use in motor vehicles impelled the negotiations that resulted in the merger, the purpose being to obtain a well established plant with sufficient facilities to meet the enormous demands of the industry. The combination of manufacturing and selling organizations has obviously much to commend it.

The contracts and the service obligations of the Rushmore company will be carried out and the intention is to continue the production of Rushmore products with such refinements and improvements as time may suggest. The Plainfield plant has about 100,000 square feet of floor space and when operated to capacity employs 700 men. The Springfield factory of the Bosch company is of equal size and about the same number of men are employed. The present intention is to produce the Bosch magnetos and other ignition apparatus at Springfield, and the lighting and engine starting equipment, as well as the searchlights which the Rushmore works specialized, at Plainfield.

The manufacturing and selling organizations will be directed by the Bosch company, but the production at the Plainfield works will be in charge of the same heads of departments as before. The Bosch company has four branches and 239 service stations, which will now include service for Rushmore equipment. The work at the two plants will be under the supervision of Victor Kliersath as chief engineer, and C. M. Wills as factory superintendent.

The New York service station of the H. W. Johns-Manville Company, formerly at Broadway and 76th street, has been removed to 1930 Broadway. The new quarters include a showroom, office, stockroom and a speedometer repair department. In the rear is ample room for a half dozen cars.

An electric vehicle show will be held in Grand Central Palace, New York City, Oct. 7 to 17. The show will be under the direction of George M. Parker of the New York Edison Company.

BUYS 1000 KELLY TRUCKS.

The Kelly-Springfield Motor Truck Company, Springfield, O., has sold 1000 one-ton trucks to the National Pure Water Company, Kansas City, Mo. This order will be delivered at the rate of 100 a month during 1915. The trucks are to be uniformly equipped, each to have a platform body to carry 54 five-gallon bottles of water. The chassis will be the standard Kelly-Springfield K-30 with 120-inch wheelbase and nine-foot loading space back of the driver's seat.

The contract signed by the National Water Company provides that the Kelly-Springfield is to furnish all gasoline driven motor truck equipment that may be purchased. The National company has the exclusive rights and patents on a new hydro-electric water purifying machine. The company will lease these machines to agents in all sections of the country, and when an agency is taken over, a complete outfit, including motor truck, settling tanks, cooling stands, bottles, etc., is sold by the National company. This will make the equipment of every agent uniform, and the parent company will know that they are adequately equipped to handle the business.

GENERAL MOTORS BIG YEAR.

For the past fiscal year the General Motors Company earned a gross of between \$90,000,000 and \$92,000,000, an increase of 40 per cent. in two years. Net profits are expected to be approximately the same as 1913, when the balance applicable to the stock was \$8,184,052. Less than \$1,700,000 is required for interest on notes and the seven per cent. preferred stock dividend. The company's cash position is stated to be 100 per cent. better than a year ago and its debts are reported almost nothing.

NEW MUFFLER CONCERN.

The Dunkirk Corporation, Dunkirk, N. Y., has been formed with a capital of \$30,000 to take over the business of the Motor & Manufacturing Company of that city, which recently went into bankruptcy. Automobile mufflers and other accessories will be made by the new concern. The officers are: R. J. Gross, president; O. F. Hakes, vice president; E. H. Caldwell, secretary and consulting engineer, and E. K. Butolph, treasurer and manager.

The plant of the Columbia Motor Car Company, recently acquired by the Billings & Spencer Company, Hartford, Conn., is being put in order. The first lot of equipment was moved into the building Aug. 1.

The Michigan Brass & Foundry Company, which was purchased recently by capitalists of Battle Creek, Mich., is being moved to that city.

MUNICIPAL AND PUBLIC SERVICE NOTES.

Practicality and Economy of Motor Street Cleaning Apparatus--Results from Motorizing Chattanooga Fire Department--Tramways and Omnibuses in Competition.

STREET sweeping and street watering with motor apparatus has proven to be extremely economical in Paris, where several types of machines have been utilized and very good knowledge has been obtained through close observation. The apparatus is designed for either sweeping or watering, or is a combination type that waters the paving to suppress the dust and then sweeps it. The first machine used was steam driven, was delivered in 1904, and has been in service since. In the last two years other apparatus has been added, until a considerable part of the work is now done by machines, and the experience has been that for either sweeping or watering the cost is approximately half the expense that would be entailed with animal brushes or tanks. This estimate is with a very safe margin for extraordinary expense.

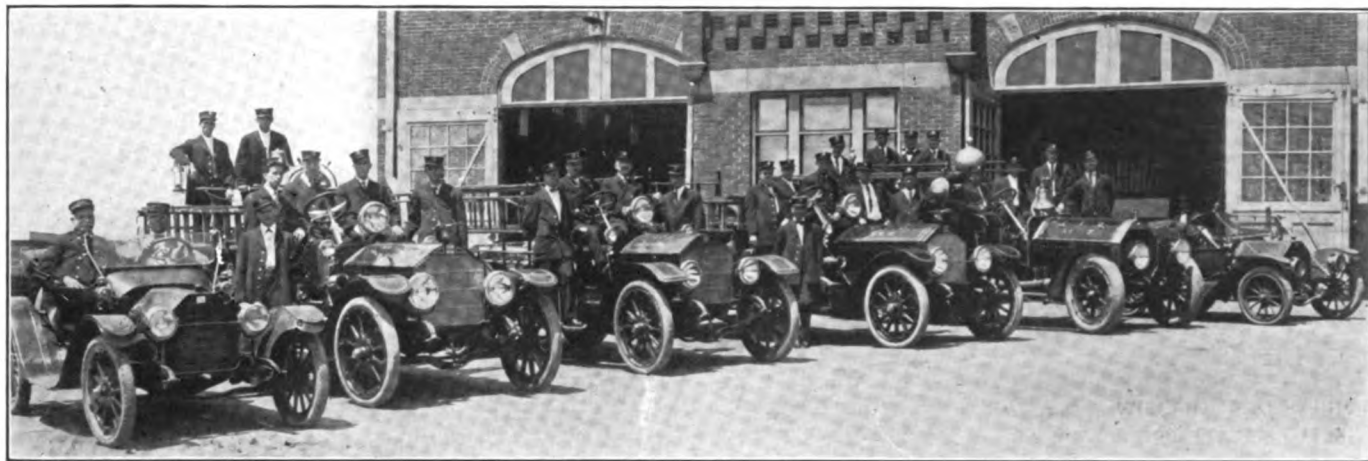
The Paris experience is that a motor sweeper will cover about 17,000 square yards an hour, which is ap-

proximately four times the area that a horse machine would clean. The cost of a horse sweeper is estimated from experience to be \$4.60 daily, and the machine cost \$8.68 a day, which indicates that the saving is rather more than 50 per cent. The water apparatus works out even more economically, although the tanks are comparatively small, having capacity of 660 gallons. Working 10 hours a day, the machine will serve an area of 328,900 square yards, distributing a gallon of water to each 20 yards of surface, and the horse tank will water about 42,000 square yards. The cost of the motor apparatus has been found to average \$7.60 a day, and the cost of six animal tanks would be \$16.80, this representing a saving of more than half.

The results have been so satisfactory that the number of machines has been steadily increased, and there is reason to believe that the greater part of this work

CHATTANOOGA'S MOTOR FIRE APPARATUS.

The fire department of the city of Chattanooga, Tenn., is being motorized rapidly, the utility of the first apparatus secured being quickly demonstrated. The city has been practically benefited by the motor equipment, not only in better service without increasing the number of men, affording increased protection to the suburban sections without erecting new fire stations, but in a material decrease of insurance rates. The city has now in service a triple combination fire



The Automobile Fire Apparatus of Chattanooga, Tenn., Which Has Materially Increased the Efficiency of the Department and Much Reduced the Losses.

pump, three combination hose and chemical wagons, and runabouts for the use of the chief and the assistant chief.

The illustration shows the motor apparatus of the city assembled at a central station directly after the arrival of the latest machines last month. The adequate fire protection of the city is regarded by the Chamber of Commerce as one of the most potent inducements that can be offered to business houses and industries to establish themselves in Chattanooga, and the publicity distributed by that body emphasizes the progressiveness of the community and the completeness of its installation.

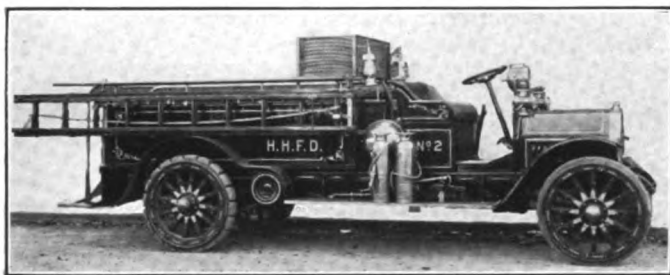
Substantiation of the results of the increased efficiency of the fire department is demonstrated by a statement of the fire losses for recent years, which shows a very large decrease since the purchase of the

motor driven machines. The department of fire and police is controlled by Commissioner T. C. Betterton, who has also purchased two motor patrol wagons and a runabout for the chief of police. The practical service of the police has been materially improved with the use of the machines without increasing the number of men.

MOTOR 'BUS AND TRAMWAY COMPETITION.

The tramways operated by London county council and the public service afforded by the London General Omnibus Company have been in active competition for a number of years, and when the last annual fiscal report of the municipal organization was made public there was a shortage of approximately \$440,000, without allowance for depreciation, which is expected to make a total of something like \$1,250,000. From the viewpoint of the financial interests the deficit is due to the popular preference for the motor omnibuses, and the fact that the service is better and more general than that afforded by the tramways.

The municipally owned tramways are expected to be at least self-sustaining. The deficit of revenue must be made up from taxation of the people. There is lit-



Federal Combination Hose and Chemical Wagons in Service at Houston Heights, Tex.

tle probability that the tramways will have greater productiveness, as no exclusive franchise is held and the same streets may be served by the omnibus companies. The suggestion is made that there should be a traffic agreement by the tramways administration and the omnibus companies, with a view of minimizing the competition and increasing the earnings of the railroad, but as the omnibus service is private property, developed at very large cost and reasonably productive, there is no reason to believe that those interested in them will be willing to make concessions that will in any manner reduce the revenues. The situation is peculiar, and the solution would appear to be the eventual municipal ownership of the omnibus companies.

MOTORS FOR LONDON FIRE DEPARTMENT.

The finance committee of the London county council is considering a plan for the motorization of the London fire department, and while this has not been decided, the proposal is to discontinue the use of some of the sub-stations and to dismiss the men attached to them, depending upon the strength of the companies that will have motor apparatus to meet all re-

quirements. The plan comprehends that the changes be made slowly and that the expense of motorizing be defrayed by increased taxes, with the expectation that eventually there will be a decided reduction in the cost of maintenance because of the greater economy of the motor apparatus. The cost will in this manner be extended over a period of years instead of being incurred at one time, and it will be paid practically as it is incurred.

ORDERS FOR MARTIN FIRE APPARATUS.

The Martin Carriage Works, York, Penn., is busy turning out motor truck fire apparatus. A combination chemical and hose wagon truck of the Martin standard type B, built for the Collingswood Fire Company No. 1, Collingswood, N. J., has been shipped. The truck has a chemical tank capacity of 70 gallons, contained in two tanks of 35 gallons each, while the body has a capacity of 1000 feet of 2½-inch fire hose. It has a wheelbase of 140 inches and is equipped with a 40-horsepower Wisconsin motor and a double ignition system. The equipment also consists of an electric starter and a 40-candlepower 10-inch searchlight upon the dashboard, as well as two 10-inch 24-candlepower lamps in front.

A similar truck of type B class is being finished for the Princeton, N. J., Chemical Company, and another will be built for that city as soon as that now building is completed. A truck of the largest type is being built for the Good Will Fire Company of West Chester, Penn. The Martin company has just delivered a type A motor hose wagon to the Vigilant company, York, Penn., the second motor truck fire apparatus to be delivered to that department within six months. Work is being rushed on a type A combination wagon truck for the Union Fire Company of York, Penn.

Contracts for fire apparatus of similar character have been secured by the Martin works for a number of cities in Pennsylvania, Delaware and New Jersey, and the company will be busy filling orders throughout the summer and fall.

FIRE APPARATUS FOR TEXAS.

The accompanying illustration is of a 1½-ton truck built by the Federal Motor Truck Company, Detroit, for the fire department of Houston Heights, Tex. The special body, which carries ladders, rope and four chemical extinguishers, is mounted on a chassis which weighs 3850 pounds. The four-cylinder, L head motor has 4⅛-inch bore and 5¼-inch stroke; it is rated at 30 horsepower and has a maximum speed of 1000 revolutions. The drive is through a 16-inch leather-faced steel cone clutch, selective three-speed power transmission gearset, floating jackshaft and chains to the rear axle. The wooden wheels are 36 inches in diameter, with 3½-inch tires in front and five-inch tires in rear. Two sets of expanding brakes are provided, one 13 inches in diameter and two inches wide, on the jackshaft; the other, 16 inches in diameter and three inches wide, on the rear wheels.

NEW PUBLIC SERVICE ENTERPRISES.

The Pacific Motor Coach Company, Los Angeles, Cal., the company that will operate the 'bus lines between Los Angeles and various nearby cities, will use 3½-ton Kelly chassis, made by the Kelly-Springfield Motor Truck Company, Springfield, Mass., fitted with bodies built by the St. Louis Car Company, St. Louis, Mo. The maximum speed will be between 18 and 20 miles per hour, and the 'buses have a seating capacity of 54 passengers, 30 of whom will be carried on the upper deck. The company has ordered 104 chassis. The chassis used is a stock 3½-ton design, fitted with six-inch dual rear tires and specially heavy axles. The motor is a four-cylinder water-cooled type, suspended on three points. The cylinders are T head, cast in pairs, and the bore and stroke is 4½ by 6⅞ inches. Speed changes are effected through a three-speed sliding gearset. It is expected that the Pacific Coach Company will have the concession for motor transportation within the grounds of the Panama-Pacific Exposition.

Bids are invited by Toronto, Canada, officials for motor 'buses which are to be placed in service as soon as possible. A by-law authorizing the expenditure of \$300,000 for this purpose by the city is to be submitted to the people shortly, and as there is a strong public demand for the establishment of several lines in North and West Toronto, there is no question of it being passed. A large number of machines will be needed.

The City and Suburban Motor 'Bus Company, Ltd., Toronto, Canada, has been incorporated with \$250,000 capital stock, and has received a charter to do a general transportation business, and run motor omnibuses in that city.

The Havana Motor Omnibus Company has inaugurated a service with six Daimler omnibuses, carrying 20 passengers each, operating between Havana and Vedado.

MOTORIZED POSTAL EQUIPMENT.

Postmaster-General Burleson has placed a premium upon mail carriers using motor cars. Carriers who cover the rural sections in motor cars are to receive annual salaries of \$1800 instead of \$1200. The average motor car mail carrier is to cover 50 miles a day, whereas the other rural carriers using animals cover only half this distance.

Cleveland's parcel post business has grown so rapidly that Postmaster Murphy has asked for eight motor trucks to handle it. In a letter to Postmaster-General Burleson recommending trucks, he states that motorcycle boxes are inadequate.

MUNICIPAL SERVICE AND EQUIPMENT.

The City of Anacortes, Wash., has purchased a Republic truck, made by the Alma Motor Car Com-

pany, Alma, Mich. A committee appointed by the city tried out a number of trucks, but finally selected the Republic after watching its hill-climbing and other work. As a final test the Republic truck made the run from Seattle, Wash., to Anacortes, approximately 100 miles, in six hours and 15 minutes, consuming only seven gallons of gasoline.

Mayor Kay, Elmira, N. Y., in answer to a communication which he sent to the government authorities of Winnipeg, Canada, asking the price paid for the aerial motor truck furnished to that city by the La France Engine Company, Elmira, N. Y., received a reply stating that Winnipeg paid \$14,175 for its 75-foot ladder truck. Elmira paid \$11,000 for a similar apparatus.

The nine Packard patrols which the police department is using in Detroit, Mich., covered a total of 80,188 miles during the year ended June 24, 1914. The average mileage for each patrol was 8909 miles, while the average daily mileage a vehicle was 24.4 miles. A total of 50,613 runs were made during the year, or an average of 5623 a car.

Service Director Sidle, Cleveland, O., has asked the council to authorize an issuance of \$100,000 bonds to cover the cost of three new collection stations and truck equipment for garage collections.

MUNICIPAL ACTIVITIES AND ORDERS.

After experimenting with various types of pavement, the street department of Hartford, Conn., will try concrete on some of the main travelled highways. The state highway department has laid several stretches of concrete this season.

The latest traffic rule in Milwaukee is that motor cars and other vehicles must not cross street intersections in the downtown district at a rate of speed greater than 7½ miles per hour.

WILL MAKE JOHNSON CARBURETORS.

The Johnson Carburetor Company has been organized in Detroit, Mich., by C. F. Johnson, carburetor engineer of the Cadillac Motor Car Company; Harry Potter, sales manager of the McCord Manufacturing Company, and Rex Johnson, production manager of the Cadillac Motor Car Company. The plant is located at 272 Harper avenue. H. W. Farr is sales manager, with offices in the Union Trust building.

Orders have been placed for six new auto trucks to collect the mail in the residential section of Louisville, Ky. The new service will be put into operation Sept. 1.

The Chase Motor Truck Company, Syracuse, N. Y., is to open an agency in Columbia, S. C. E. J. Conley will be in charge.

NEW BRASIE COMPANY.

The Brasie Motor Car Company, Minneapolis, Minn., has been formed with a capital of \$100,000 for the manufacture of motor cars and trucks. This company takes the place of the Brasie Motor Truck Company, which manufactured the Twin City truck. In its incorporation the company enlarges its scope and will make a cyclecar and cyclecar delivery wagon, as well as a trailer.

Delivery of trucks has begun and cyclecar deliveries will begin in 30 days and pleasure cars in 60 days. The delivery car has a panel body of 28½ by 51½ inches by four feet high and will carry 36 single grocery boxes. The capacity is 400 pounds and the weight is 900 pounds. The same chassis is used for the pleasure car. The Twin City truck chassis will be continued at two-ton capacity, with body to suit the purchaser.

PLAN BIG NEW ORLEANS FACTORY.

The Southern Automobile & Supply Company, New Orleans, Ala., has been organized with capital of \$1,000,000 to establish automobile works in that city. It plans to build seven buildings covering five acres. Machinery will be installed to manufacture every part of an automobile, for constructing motor boats, gasoline engines, etc. Construction bids for the building will be opened Nov. 15 and machinery bids about Dec. 1.

TWO-DECK STEPLESS 'BUS.

A double-deck stepless 'bus, seating 38 people, has been designed by P. K. Hexter, New York City. The door is at the right side and the floor is so low that when the 'bus stops alongside the curb the floor is flush with the sidewalk. Access to the upper deck, which is open, is had through a stairway that runs back from the side door.

FRENCH TRUCK TRIALS ABANDONED.

The annual trials for the French army motor trucks, which had been in progress from June 29 near Versailles, were ordered stopped when war threatened. The vehicles still in the competition were accepted as suitable for government subsidies, and were ordered to remain at the disposition of the government.

WANTS TO DECLARE DIVIDEND.

The Cleveland-Galion Motor Truck Company, Cleveland, O., has asked authority to pay a second dividend of 15 per cent. to its creditors. This is asked in a report to the Cuyahoga county court, and a hearing has been fixed for Aug. 19.

FRENCH FACTORIES CLOSED.

Automobile factories in France have been closed by the war, and activity is confined to the aeroplane and aeroplane motor factories. The latest reports received state that the section of the Renault factory producing aeroplane motors is under army control. This is also true of the Gnome motor works, and the Le Rhone plant.

On Aug. 1 all purchasing by the automobile manufacturers stopped, and customers refused to take the cars that were ordered. Workmen were immediately discharged and department heads began taking inventories.

WILSON COMPANY TO BUILD TRUCKS.

The C. J. Wilson Company, Detroit, Mich., top makers, will place a 1½-ton truck in the market early in September. The company, of which C. J. Wilson is president and general manager, and Stanley C. Wilson, secretary-treasurer, has no connection with the C. R. Wilson Body Company of the same city. G. Earl Porter, formerly with the Admiral Motor Truck Company, is the designer of the new truck, and G. A. Freeman, formerly with the Warren Motor Company, has become purchasing agent.

SMALL WAGENHALS MACHINE.

The Wagenhals Motor Car Company, Detroit, Mich., is testing a smaller model of the three-wheeled Wagenhals package delivery vehicle. The new parcel machine has a four-cylinder, four-cycle motor, with a bore of 2¾ inches and a stroke of four inches. The carrying capacity will be between 400 and 500 pounds. It is expected to be ready in the fall.

PATENT A FARM TRACTOR.

Two young men of Westerville, O., have secured patents on a motor driven tractor which they claim will revolutionize farm work. The machine is so constructed that it can be adapted for pumping water, grinding feed, cutting wood, churning and other farm work.

S. A. E. COUNCIL TO MEET.

The next council meeting of the Society of Automobile Engineers will be held in New York City Aug. 24-25, at which time the proposed European trip will be discussed. Undoubtedly it will be deferred.

The Lookout Bending Company, Chattanooga, Tenn., will erect a plant at Sulphur Springs, Ga., to manufacture automobile wheel rims and spokes.

"OPEN DOOR" AT JEFFERY SALES CONVENTION.

PLANNING a selling campaign is an undertaking of magnitude if the volume of business sought is material, and the organization is to be active in all sections of the country, for to obtain uniformity of results those who have personal relations with the public must understand policies and the attitude of the company, as well as possessing a thorough practical knowledge of the production and the practise in connection with its utilization.

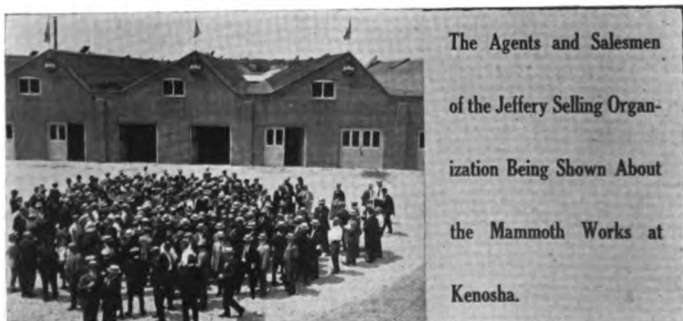
The Thomas B. Jeffery Company, Kenosha, Wis., convened its entire executive sales force at the big factory Aug. 4 and 5 and extended invitations as well to motor vehicle dealers selling the products of other concerns, bringing together more than 300 men who are important factors in the distribution of pleasure and freight machines in all parts of the country. The presence of men selling automobile cars and trucks



A Group of Department Managers and Representatives Gathered for the Convention at the Jeffery Factory.

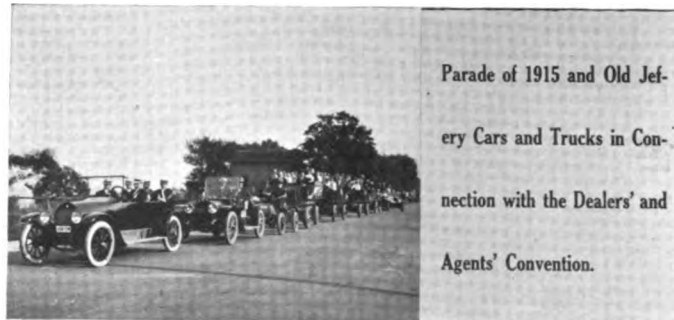
other than the Jeffery organization is an innovation that this company is pioneering, the purpose being to make known to the industry and trade at each annual convention the developments of the year, both in factory and laboratory tests, as well as the conclusions from investigations made by its engineers abroad.

The convention was decidedly the largest in the history of the company and it was particularly beneficial, because the policy inaugurated appealed to every person, and the activities of the two days were planned with a view of making the meetings particularly instructive and interesting. The sessions were given over both to pleasure cars and freight vehicles, each division of the business having equal attention, and as each sales representative has occasion to deal with all classes of machines no phase was neglected that might be considered as in any way essential.



The Agents and Salesmen of the Jeffery Selling Organization Being Shown About the Mammoth Works at Kenosha.

The opening session of the convention was begun with an announcement of the programme by Assistant Sales Manager H. C. Hill, who introduced Assistant



Parade of 1915 and Old Jeffery Cars and Trucks in Connection with the Dealers' and Agents' Convention.

General Manager Lewis H. Bill as the man responsible for the Jeffery types produced. Mr. Bill spoke interestingly of the policies of the company, its equipment and facilities, the efficiency of the engineers, and the general character and qualities of the Jeffery vehicles. Then followed an examination and explanation of the Jeffery six-cylinder pleasure car, a making of a big group photograph, and lunch.

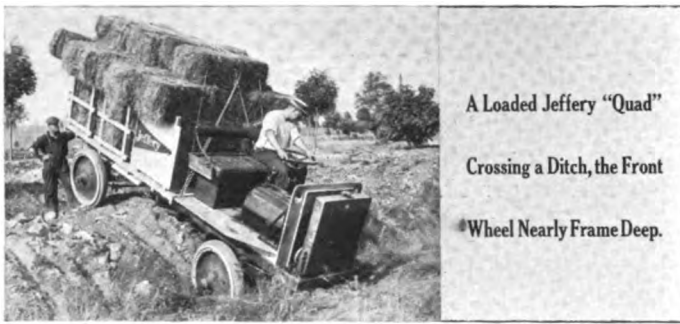
The afternoon session was largely devoted to an address by E. S. Jordan, secretary and general sales manager of the company, who dwelt upon the sales policy, making comparisons of the cars with the ideal car considered by the S. A. E. members at the mid-summer meeting, his arguments being emphasized by large cartoons. A parade of 60 Jeffery cars, headed by a 1915 six-cylinder machine, followed by an ancient one-lunger that represented the first Jeffery product,



The Temporary Kitchen and Dining Hall Under Tents, Where the Delegates to the Jeffery Convention Were Entertained.

through the streets of Kenosha and Racine, and a vaudeville entertainment and club hospitality in the evening brought the day to a close.

The second day's sessions were begun with field trials of a Jeffery "Quad", which was explained by Chief Engineer Eskey, and then came addresses by Sales Manager Morgan of the truck department and Walter Wardrop, both of whom spoke of motor truck transportation. The afternoon was devoted to addresses by C. P. Rockwell of Boston, Mass.; A. M. Robbins of the Centaur Motor Car Company of Chicago, and Edward Lyndon, these being of a general selling character.



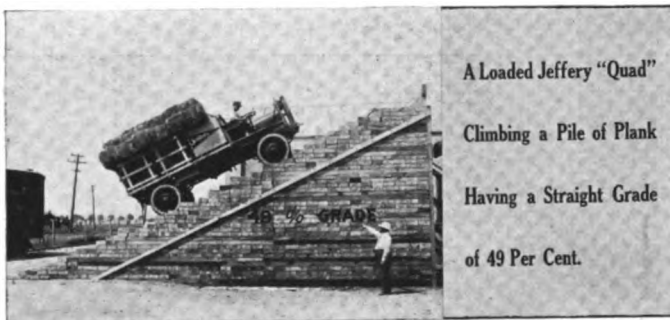
A Loaded Jeffery "Quad"
Crossing a Ditch, the Front
Wheel Nearly Frame Deep.

SELLING a vehicle intended for freight transportation is an entirely different proposition from closing with a customer whose choice may be influenced by appearance that nearest meets with his individual ideas of sightliness, and who may be inclined to sacrifice undoubted merit because of opinion founded on nothing more than casual comment of those absolutely uninformed.

Viewing the market from a broad viewpoint, with a desire to make sales that will be of large proportions, three elements are essential to insure success—a standardized product, a thorough knowledge of its practical use by the selling organization, and the confidence of the people in the statements that are made concerning it. To obtain these factors the policy of the manufacturer must be clearly defined and it must be consistently adhered to at all times.

Standardization an Important Factor.

Standardization has been quite as important as any other one factor in the success of American industries, this insuring maximum manufacturing economy, as well as uniformity of efficiency, and what can be applied to practically every other industry is equally ap-



A Loaded Jeffery "Quad"
Climbing a Pile of Plank
Having a Straight Grade
of 49 Per Cent.

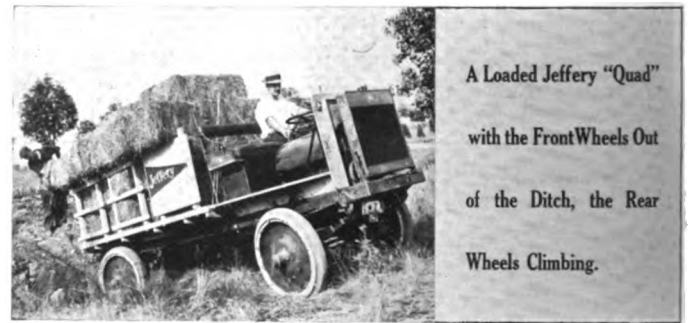
plicable to motor vehicle production. There is no question that the value of standardizing has been realized by those who build motor wagons and trucks, and while publicity has been sought by many this has generally not been of a character that will be creative of public confidence that is so vitally necessary.

In the desire to establish branches and agencies financial reliability has been more highly regarded than complete knowledge of vehicle capacity, and statements made by individuals, based largely on desire to close sales, are not always of a nature that would be approved by the manufacturer. Facts that are undeniably conservatively stated are often ridiculed because selling arguments are liberally discounted, especially by competitors,

EDUCATING SALES

Practical Illustrations of the Service to Field Organization at the

Not only this, statements that are not uniformly made afford opportunity for controversy and have not the weight of those that carefully and systematically relate to a condition or a result. Regarding possibilities from the viewpoint of what might be termed safe and sane business methods, every form of publicity should be prepared with a definite purpose, not with the supposition that any reference is productive of good results. As a matter of fact the only logical



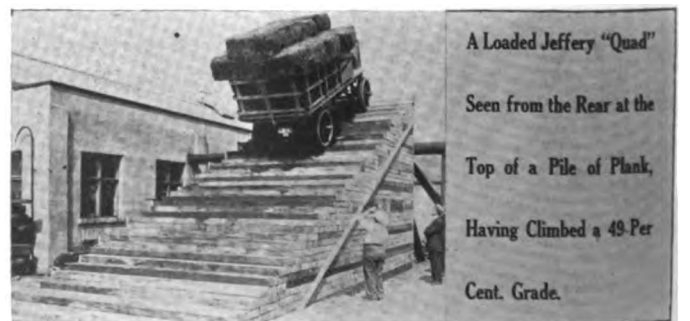
A Loaded Jeffery "Quad"
with the Front Wheels Out
of the Ditch, the Rear
Wheels Climbing.

promotion is that which cannot be controverted and which is so practically presented that no one can misunderstand.

This policy, that is applicable to any business, has been established by several motor truck manufacturers who believe they have sufficiently developed vehicles to justify standardization, but the training of the selling force by object lessons that are open to the public and to any others of the industry who may be interested in them, is an innovation with the Thomas B. Jeffery Company, Kenosha, Wis., builder of pleasure cars and freight carrying machines.

Actual Work and Demonstration Differ.

The business man seeks a vehicle of a stated capacity and he is informed that what is shown to him is sufficient for the purposes required. He is solicitous as to power and economy and endurance. The engine rating is usually quoted and the other facts are stated in the form of statistics gathered from a source that may in no sense be parallel with the service for which a machine is desired. A demonstration of work may be given by a machine driven by a man who is willing



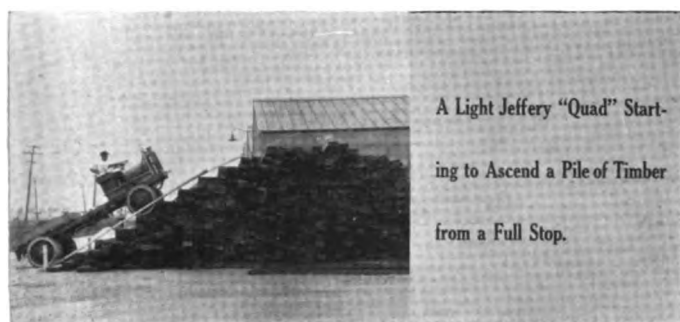
A Loaded Jeffery "Quad"
Seen from the Rear at the
Top of a Pile of Plank,
Having Climbed a 49 Per
Cent. Grade.

FORCES BY TRIALS.

Possible with Jeffery "Quad" Given Gathering at Kenosha Plant.

to work hard with the intention of making the best showing that is possible, but the results may be different when the vehicle is in charge of a driver who is willing to give what he believes a fair day's labor for the pay he receives.

But while these are conditions that are ordinarily met with, the statements that may deal with unusual capacity or quality lose weight and value through failure to apply them to good advantage. The executive



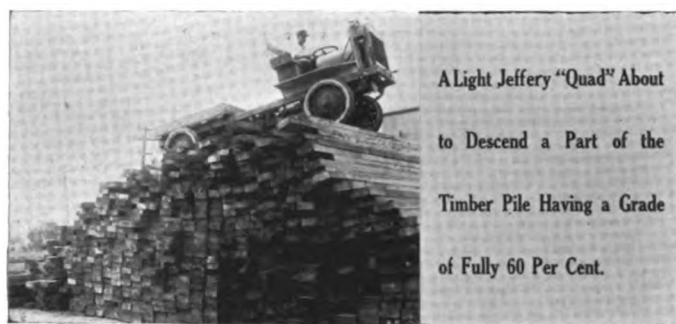
A Light Jeffery "Quad" Starting to Ascend a Pile of Timber from a Full Stop.

of the selling force who can stake his business reputation upon a result, who can substantiate his statements, and who knows that there will be a sufficient reserve to meet any requirement that may arise, does not resort to the less convincing arguments or generalities. He has, if the method of the Jeffery Company is followed, substantiation from those engaged in manufacturing and selling vehicles, who will have opportunity to detect weaknesses or stage effects, because they are familiar with the subject and know whether or not the results are legitimate and whether or not they are of material or doubtful value.

Manufacturer Must Establish Confidence.

Regarded fairly, the invitation of an industry to possibilities of work is also productive of fair criticism, and the manufacturer who is willing to stand upon the quality of his products, as judged by his competitors, as well as the users, must have at least confidence in what he is establishing. There can be no suggestion of deception.

At the convention of the Jeffery selling organization and representatives of the industry at Kenosha



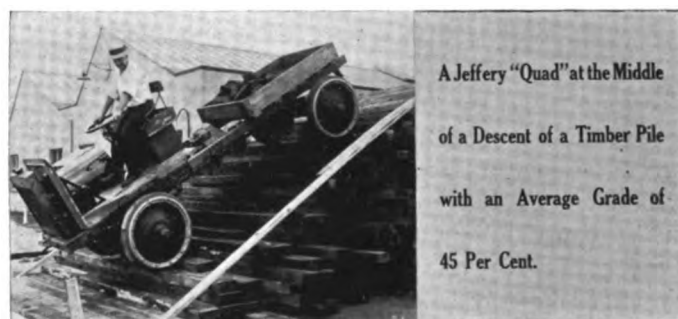
A Light Jeffery "Quad" About to Descend a Part of the Timber Pile Having a Grade of Fully 60 Per Cent.

the practical utility of the Jeffery "Quad", a 3000-pound capacity truck, driven by four wheels, and designed especially to meet the specifications of the Quartermaster General's Department of the United States Army, was demonstrated in a manner that was as surprising as it was original. The construction of the machine was explained by the chief engineer of the company, and then a driver was instructed to do some work that was claimed practically possible, but so much in excess of requirements that the conditions would probably never be realized in ordinary service.

Results Convince the Selling Forces.

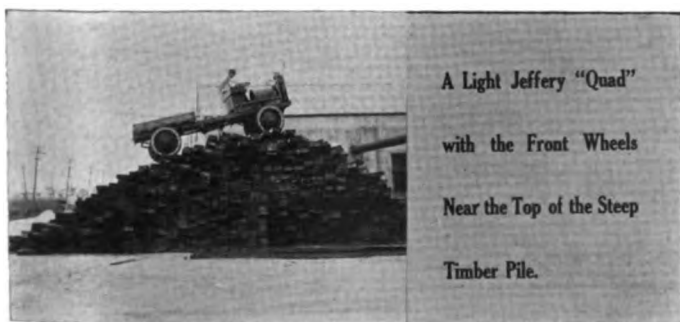
To drive a truck to a 16-inch log in a field and over the obstruction that would be regarded as an impassable barrier was an example, and then with a two-ton load of hay a soft plowed field was driven through, ditches that were from 12 to 16 inches deep were driven over, the forward wheels lifting with the same power that was applied to traction with the rear wheels. Either forward or backward movement was equally efficient.

Next, the machine was driven to the top of a pile



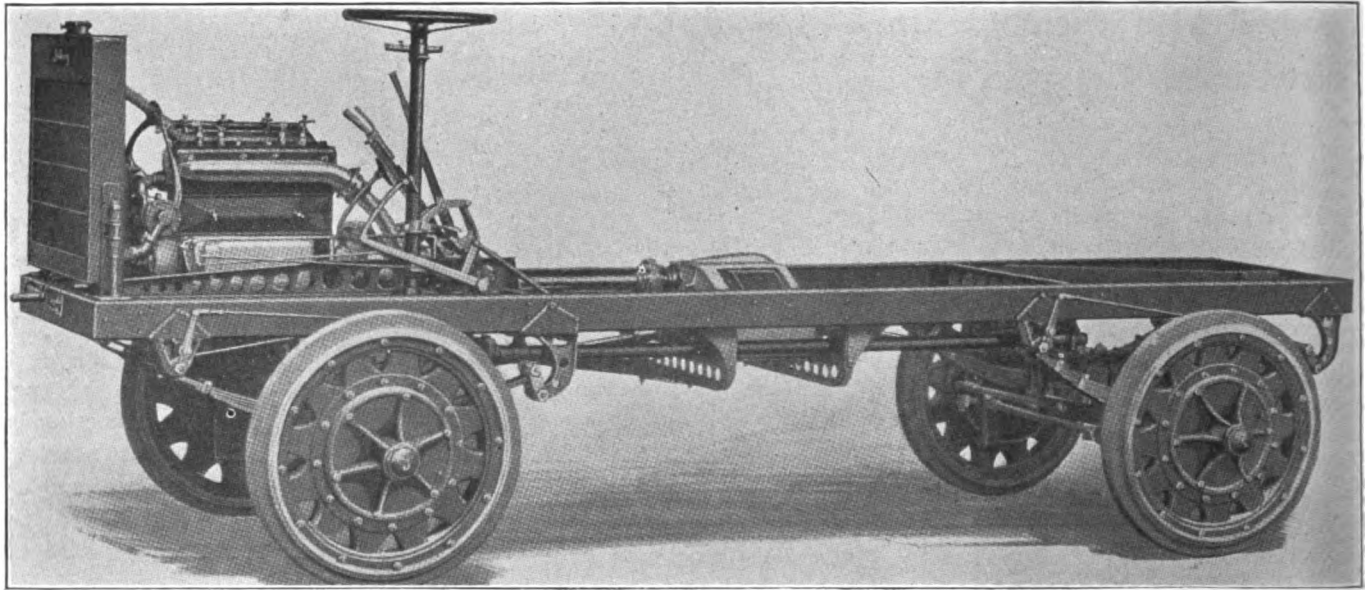
A Jeffery "Quad" at the Middle of a Descent of a Timber Pile with an Average Grade of 45 Per Cent.

of plank up a grade that was 49 per cent., stopped and started on the ascent, and on reaching the top it was backed down, this being a demonstration of power and brake efficiency. Not only this, the machine was driven up and over a pile of plank that required a short descent of approximately 60 degrees. While the drop was not of great height it was such that it would not be attempted save by one who had absolute knowledge of and the greatest confidence in his machine. These trials were staged with the belief that they would not be attempted by the average driver, in normal service, but that they did demonstrate the remarkable possibilities of the type of vehicle as well as the certainty of control. Some of these trials are illustrated on these pages and are worthy the consideration of every man interested in motor truck service.



A Light Jeffery "Quad" with the Front Wheels Near the Top of the Steep Timber Pile.

JEFFERY QUADRUPLE DRIVE TRUCK.



Stripped Chassis of the Jeffery Four-Wheel Driven 3000-Pound Capacity Truck.

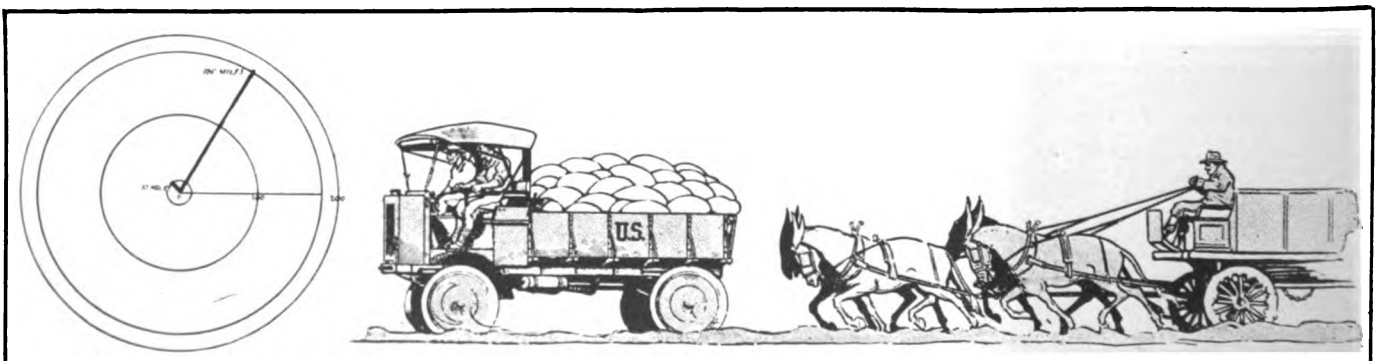
RATING a motor driven wagon as equal to a four-mule team seems to be an inadequate and insufficient indication of serviceability, especially when the claim is made that the machine is the most satisfactory and efficient of its type that has been developed by the American motor vehicle industry, but the reason for this unusual statement is that the Thomas B. Jeffery Company, maker of the "Quad", built it to meet the specifications of the Quartermaster-General's Department of the United States army, and the requirements of the service were that the truck should be practically serviceable "wherever a four-mule team could be used". When the reason for the rating is understood there may be inquiry as to the difference between the two forms of transportation, for the truck has normal capacity of 3000 pounds and the mule team will certainly haul equal weight. To this reply is made that the limitation of the animals is 15 miles daily hauling a standard escort wagon, while the machine can be driven 100 miles daily with its load. In other words, the difference is 100 miles as against 15, with the same freight.

The Jeffery "Quad" is so designated from the fact it is driven and steered by, and the brake is applied on all four wheels, this affording the highest degree

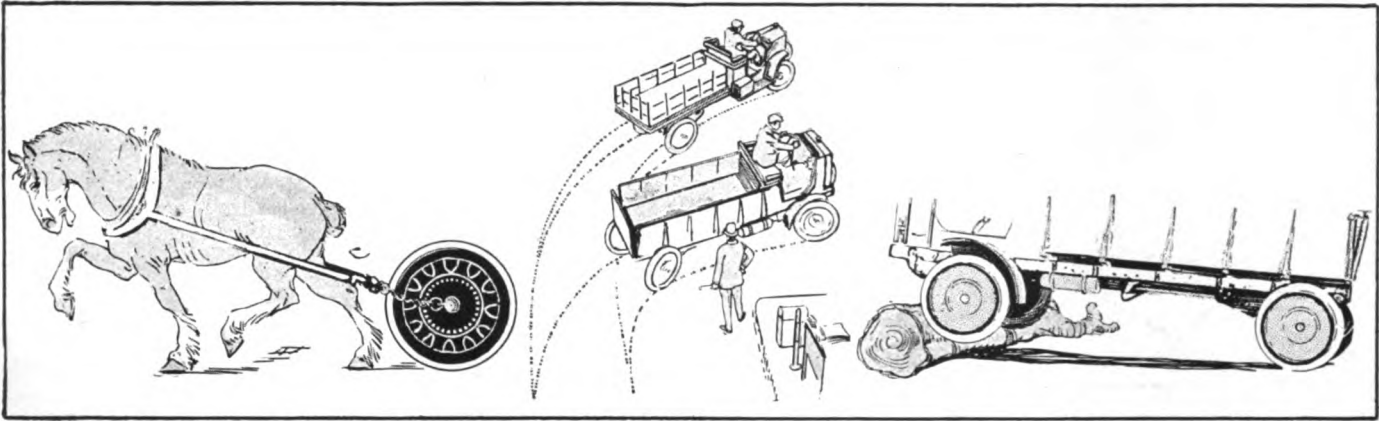
of control. The tractive effort is applied equally theoretically, but as a matter of fact the traction may be by from one to four wheels, depending upon the condition of the surfaces on which they rest. With all four driving there is exactly the same propulsive force with the forward as with the rear wheels, for the machine is designed to equalize the weight of vehicle and load at all points of support.

The machine that is driven by two rear wheels carries the forward wheels over any obstruction by momentum, and when these are in a depression the tractive effort must be sufficient to lift them out. When driven by the two forward wheels the effort is more like that of a horse drawing a vehicle, the velocity and the traction combining to more readily raise the weight as the obstruction is met. But with the four-wheel driven vehicle the power values of the two forms are united and a maximum of efficiency is realized. This in brief describes the reasons why a "quadruple drive" motor wagon or truck will haul a given load in conditions where the other types of vehicles will not afford equally satisfactory results.

The Jeffery "Quad" is stated to be developed not only for the purpose of meeting with the requirements of the army service, which are for haulage in

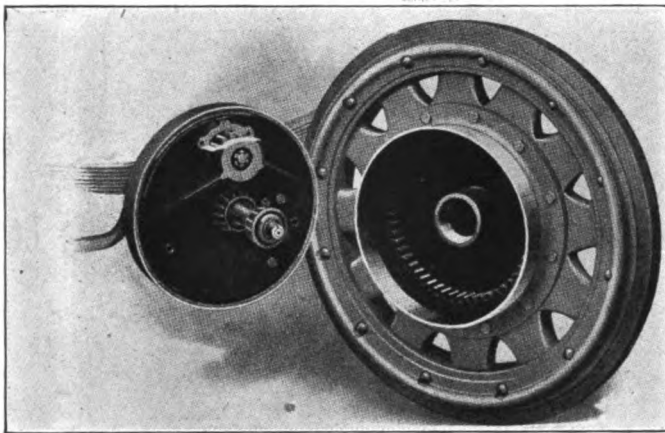


The Circles Show the Two Average Daily Mileages of the Jeffery "Quad" and a Four-Mule Team.



An Additional Horsepower for Each Wheel, a Shorter Turning Radius and Power to Climb Obstructions.

any condition, but for economizing fuel consumption and for minimizing labor and attention incidental to satisfactory upkeep. One of the features of the design is the complete interchangeability of the parts. For



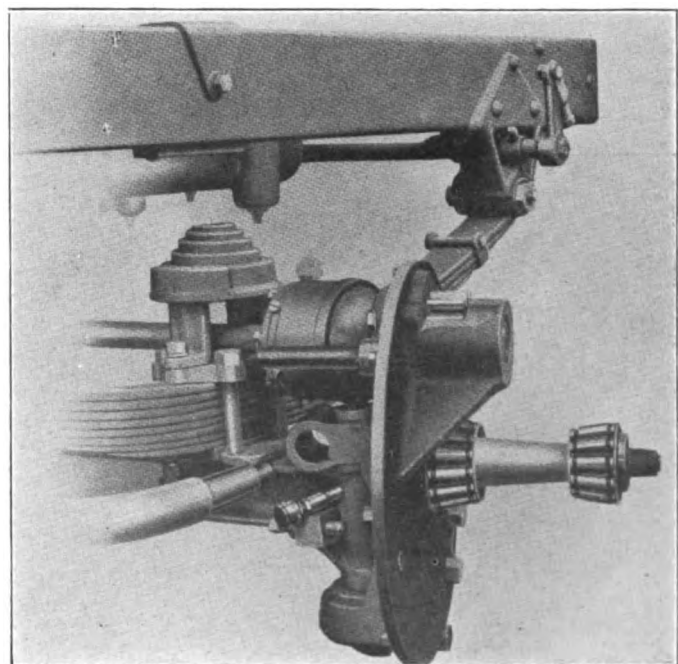
Wheel Removed from Axle Spindle, Exposing the Driving Pinion and Internal Gear.

instance, aside from the motor, clutch and gearset, practically every wearing part is alike. The axles, the cross shafts or driving axles, the propeller shafts, the differential gears, the wheels and the brakes are alike, and the entire forward running gear construction can be changed with the rear members and the exchange could not be detected, even by the engineer who designed the vehicle, unless the parts were marked. There will be absolutely no difference in efficiency. This was one of the requirements of the army specifications, replacement of standard parts insuring the fewest number of spares to store, minimum expense and labor.

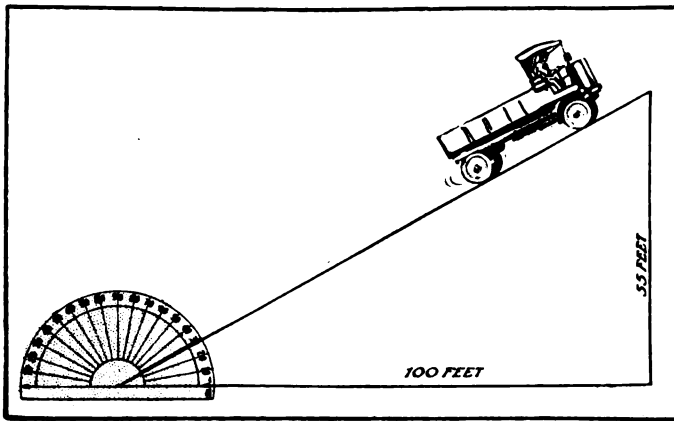
The machine is built with a motor of a four-cylinder, water-cooled, L head type, cast en bloc with cylinder bore of $3\frac{3}{4}$ inches and stroke of $5\frac{1}{4}$ inches. The rating according to the S. A. E. standard is $22\frac{1}{2}$ horsepower, but as the stroke to bore ratio is 1.40:1, the engine will develop the full power claimed for it, which is 32-40. The motor is designed for hard service, having very large water jackets to insure an adequate circulation of the cooling system, and an exhaust manifold of unusual size to minimize heating. The crank case is built with the lower half carrying the oil reservoir and the upper half the main bear-

ings. The crankshaft is of unusually large size, the main, crankpin and wristpin bearings are of extremely liberal proportions and the connecting rods and pistons are light in weight, but strong and perfectly balanced. The lubrication is by combination of mechanical force feed and splash system, and is very thorough. The carburetor is an automatic float feed type that is very efficient at all engine speeds. The ignition is by a Bosch duplex system, with current supplied from magneto and batteries.

The motor is mounted on a sub-frame and the radiator, which is a tubular type with a cooling surface of 20,000 square inches, is supported on springs. The water is circulated by a centrifugal pump and radiation is promoted by a fan on an adjustable bracket, driven by a belt. The clutch is a single-disc type that is exceedingly simple and efficient, and the power is transmitted by a shaft having two universal joints to the gearset case, which is mounted on two cross girders that are 24 inches clear above the ground. The gearset is a selective sliding gear four-speed ratio construction, with reverse, the shafts being heavy and mounted



Rear Axle with Wheel Removed, to Illustrate the Features of the Construction.

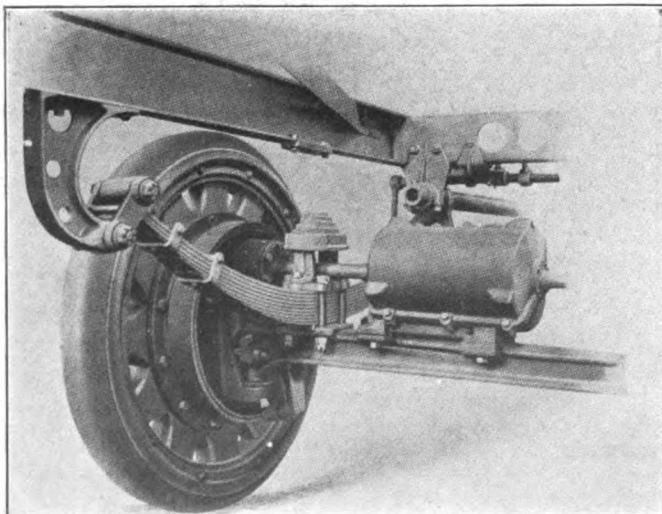


Either Set of Brakes Will Hold on a 30 Per Cent. Grade.

on large bearings, with wide faced gears. The propeller shafts extend forward and back from the gear-set at the left side, there being universal joints at either end.

The weight of the machine and its load, aside from the wheels, is carried on the two dead axles, which have heavy steering knuckles. The wheel spindles are fitted with Timken roller bearings and on each is mounted a heavy flange. Each flange serves as a cover plate for a housing that is a part of the wheel, and supports an end bearing for the driving shaft. The counter or driving shafts have two short sections at the left side and two long sections at the right, the differential being carried in steel housings mounted above the axle. Directly above the steering pivots of the knuckles are universal joints. The spur driving pinions are just inside the flanges on the wheel spindles, and these mesh with internal ring gears within the wheel housings.

When assembled the steel housing of the wheel fully encloses the wheel hub and the driving pinion and gears, and the housing serves as a brake drum. The claim is made that with the manner of applying the power, with internal ring gear of considerable size, there is a material gain as compared with the usual drive by the axle shaft or jackshaft. The construction of the all-steel wheel makes for unusual strength

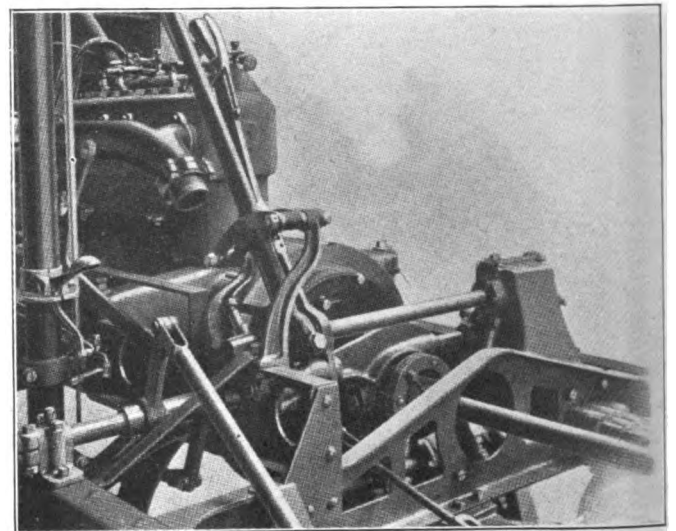


View of a Rear Wheel, Showing the Differential, Brake and the Spring Shackle.

from the fact that the housing is large and very rigid and the spokes are short, so there can never be upon them anything like the stresses sustained by wheels of conventional construction.

The frame is pressed steel channel section, heat treated, strongly braced and reinforced, 191 inches length and 38 inches width, and this is carried on semi-elliptic springs that are very wide to afford extreme flexibility. The springs are shackled at the rear ends, the driving thrust being exerted through the forward sections. The brake operates on all four wheels, the service brake being operated by pedal and all four by hand lever. The brake on either the forward or rear wheels will hold the machine loaded on a 30 per cent. grade, and when driven loaded at maximum speed it can be stopped in a distance of 11 feet.

The wheelbase is 125 inches and the turning radius is 44 feet. On the high gear ratio the speed is 14 miles an hour, on third nine miles, on second $5\frac{1}{2}$



The Lever Installation Controlling the Gear Shifts and Brake.

miles, on fourth or low $3\frac{1}{2}$, and $2\frac{1}{2}$ when reversed. The machine is driven from the left side with the usual means of control, the spark and throttle levers on the hand wheel and the speed ratios and brake lever at the driver's right. With a view of minimizing labor every part is very accessible. Clutch adjustments can be made in 30 seconds, the wheels can be changed in 10 minutes, the driving countershafts and differentials can be removed without taking off the wheels. The transmission gearset can be worked on without removing the body, and the end shaft can be taken out without disturbing the shafts and gears. The provisions for lubrication are unusually thorough. The carburetor is set so that it will not flood if the chassis is in water 34 inches deep. The materials are of high grade and all moving parts, aside from the motor and wheels, are mounted on annular ball bearings.

The wheels are 36 inches diameter and they are shod with a single-band tire, five inches width, the shoes being of the same size throughout because of the traction being equally applied and the load equally distributed.

GOODRICH EARNINGS INCREASE.

For the first six months of 1914 the B. F. Goodrich Company, Akron, O., earned a net profit of \$2,651,278. This is after proper allowances for maintenance, depreciation, bad debts and all other known outstanding liabilities. This amount added to the surplus carried over Dec. 31, 1913, shows undivided profits of approximately \$2,307,261, after deducting the regular April and July dividends on the preferred stock. From this amount the company has appropriated an amount sufficient to retire \$900,000 par value of preferred stock. The amount of quick assets over current liabilities shows a gain of \$1,628,508 for the six months.

NEW YORK GARAGE RATES INCREASE.

West side garagemen in New York City contemplate increasing the prices of automobile storage beginning Sept. 1. To offset this they plan to lower the price of gasoline so that they will make a five per cent profit. The proposed rates are in grades A and B, depending somewhat on the locality and more on the style of building, whether old or modern. Grade A rates would be \$40 for open cars and \$45 for closed cars; grade B rates would be \$35 and \$40.

IN ITS NEW FACTORY.

The Lord Baltimore Truck Company, Baltimore, Md., moved into its new building July 20. This plant, situated on Bank and Fifth streets, Highlandtown, Baltimore, is 50 by 140 feet, two stories, with a six-ton elevator. The building will be devoted to the manufacture of Lord Baltimore internal gear-driven trucks. The company has received an order from the War Department for one 3000-pound truck.

POPE ASSETS FIND BUYERS.

Col. George Pope, receiver of the Pope Manufacturing Company, Hartford, Conn., is selling the assets of the company in small parcel lots, following the order of the court. To date most of the sales have been machinery, and according to the receiver excellent prices have been realized. He estimates that he will receive a great deal more than if the plant was sold as a whole.

The Board of Technical Detail of the American Efficiency Survey of motor car units has passed upon eight units. Of the 73 units to be tested the following 10 have been completed: Spark plugs, magnetos, tires, oil, ignition cable, jacks, hand pumps, power pumps, tow line and brake lining.

An automobile truck entirely built by convicts in the Ohio penitentiary is being operated by that state.

TO BUILD LANSDEN LINE.**New Company Organized by the Purchaser of Assets of Bankrupt Firm.**

The Lansden Company, Ltd., has been formed by J. B. Wickery and associates, who have purchased the rights, patents and all parts of the former Lansden company of Newark, N. J., manufacturer of the Lansden electric truck. Mr. Wickery has removed the business to Brooklyn, N. Y., at which place he will manufacture Lansden electrics and conduct a general garage and repair station. A factory building has been leased between Flatbush and Nostrand avenues and the Long Island railroad, formerly occupied by the J. R. Corbin Company. This property has a floor space of more than 13,000 feet, with direct trackage to the Long Island system.

Mr. Wickery was manager for the trustee of the old Lansden company after the trusteeship was created about a year ago. At the sale of the property July 13, he purchased the name and good will of the company and has since acquired all patents, parts, patterns and plans which were purchased at the same sale by the New Jersey Machinery Exchange. The incorporation of the Lansden Company, Ltd., is now in progress with capital of \$250,000. The new Lansden company will begin operations immediately, and besides building electrics will repair both electric and gasoline trucks. The new line of Lansden trucks will comprise electric units from 1000 pounds to five tons capacity. There are about 1000 Lansden trucks now in operation.

The original Lansden company was established by John M. Lansden, a pioneer of the electric vehicle industry, and with him was associated Thomas A. Edison. The development work was continuous and in Lansden machines the Edison batteries were first extensively experimented. The machines were perfected and were found to be extremely serviceable and economical. Later on Mr. Edison withdrew from the company and still later Mr. Lansden withdrew and became associated with the General Motors Truck Company, he now being a vice president of that concern.

After Mr. Lansden's retirement the company was continued and eventually a proposal was made to merge it with the Webb company, maker of fire apparatus at Allentown, Penn., but after plans had been completed creditors objected and this resulted in a petition into bankruptcy and a subsequent sale of the property at material sacrifice.

The new company has the right to use the name of the founder of the company and it has possession of the patents, drawings, engineering plans, material, parts, etc., and will afford service to all Lansden vehicles and will extend its business as the demand justifies.

FREIGHT RATE INCREASE.

Manufacturers to Pay on Materials and Purchasers on Machines.

The decision of the Interstate Commerce Commission granting an increase of five per cent. in freight rates to railroads operating in the central territory is no great blow to the automobile industry. The effect of the decision will merely be that each individual purchaser of a new automobile, motor truck, tire or accessories, will pay his pro rata share of the increase, which will be infinitesimal, proportionately speaking. For instance, where the owner formerly bought a car f. o. b. Detroit, and the freight was \$40, he will now have to add an extra five per cent. to the amount, making \$42. The extra freight on a tire, or a set of tires, would be but a few pennies and would in no way materially increase the high cost of living. The manufacturers must pay the increase on materials, and will necessarily include this in the prices of machines.

There are 38 roads benefited by the five per cent., all operating in the Central Freight Association, and the territory covered is west of Buffalo and Pittsburg, north of Louisville and Cincinnati and east of Cairo, St. Louis and Chicago. Twenty-one railroads operating in eastern and New England district were refused the increase, they being told to practise economy to secure larger net earnings. However, there is no change in the railroad freight classification that makes a specific increase on automobiles alone, as was done in 1910. At that time a proposal was made to revise the classification on automobiles in carloads in such a way that a 25 per cent. increase would result, but through the opposition met with, the increase was cut to 10 per cent. The present increase is general and applies to all freight handled except coal, coke, brick, clay, cement and other similar heavy commodities.

A brief analysis of the decision of the Interstate Commerce Commission shows that the commission recommends that the railroads eliminate special privileges to large shippers, which would cut off allowance of free time for loading and unloading freight, delivery, storage and payment for wharfage, refrigeration, etc.; adoption of methods for freight car efficiency, including better arrangements for speedy loading and unloading; tabulation and classification of freight rates so that tariffs that are too low for the carrying of certain commodities may be brought up to a paying basis.

Throughout the entire fight on the part of the railroads to increase freight rates on automobiles, extending back five or six years, the National Automobile Chamber of Commerce has been actively engaged in fighting these proposed advances. The remonstrance of the Chamber of Commerce was instrumental in cutting the 1910 increase from 25 per cent. to 10 per cent. Likewise this body has held frequent meetings of automobile manufacturers' representatives to consider details of freight rates and freight classifications af-

fecting automobiles and accessories, to harmonize views so that such matters could be presented to railroads in a practical way. This organization also urged railroads from the beginning to provide freight cars suitable for automobile shipments, and there are now more than 55,000 such cars in service with extra door openings.

Lower rates on motor truck shipments were secured by the Chamber of Commerce to all points east of the Mississippi river and to the Pacific Coast, and an application is now pending with respect to other western territory. The objectionable changes proposed in the regulations governing shipments of automobiles on Great Lake steamers were also successfully opposed by the chamber.

NEW GOODYEAR TRUCK TIRE.

The Goodyear Tire & Rubber Company, Akron, O., has placed a new tire in the market, known as the S. V. truck tire. The most notable thing about it is the absence of steel fastenings of any kind. The first cost on fastenings for a truck tire of the demountable type ranges from \$3 to \$7 a wheel, and on the old style pressed-on type, the supplemental band may cost from \$3 to \$9 a wheel.

Taking the most popular size tires, this charge for steel equipment represents about 10 per cent. of the total cost of the tire, or in other words, the purchase of an S. V. tire can be considered as a 10 per cent. reduction in price.

HORSES DECREASE IN CONNECTICUT.

The steady decrease in the number of horses and mules used for transportation in Connecticut, shows the general use of automobile vehicles. In 1913, 73,819 horses and mules, valued at \$5,339,126, were taxed in that state. This is a decrease of 2711 in number in four years, but the value increased \$607,788, or \$9 a head. The value of wagons, automobiles and bicycles doubled in the four-year period, increasing from \$6,409,534 in 1909 to \$16,493,639 in 1913.

The Frost Gear and Forge Company, Jackson, Mich., has increased its capital stock to \$300,000, nearly all of which has been paid in. Plans have been made to take over the affairs of the Baker Drop Forge Company, also of Jackson, and the two concerns will be known as the Frost Gear and Forge Company.

The New York City office of the Argo Motor Company, 7 East 42nd street, was discontinued Aug. 1. The executive offices are now at Jackson, Mich., where the factory is located.

The city of Milwaukee owns 62 motor cars of various types, all of which, except the fire apparatus, are housed in a municipal garage.

IS MAIL CARRIER EXEMPT?

Does a rural free delivery carrier operating an automobile require a license? That is the question confronting the chief chauffeur license clerk of Illinois. A number of such carriers are operating without a license and say that inasmuch as they are in the federal government service a license is unnecessary. The attorney-general will probably be called upon to settle the point.

POPULAR PRICE TAXI SERVICE.

The International Cab Company is being formed to operate a chain of taxicabs in New York City, beginning Oct. 1. The new company will be a popular price system, charging 25 cents for the first half mile and five cents for each additional quarter of a mile. P. J. Holdsworth, formerly manager of the Yellow Taxicab and the Mason-Seaman taxicab companies, will be manager of the new concern.

GRADE CROSSING ELIMINATION.

State Highway Commissioner J. R. Marker of Ohio advocates the elimination of all grade, railroad and traction crossings in that state. He cites statistics showing the large number of deaths annually due to grade crossings, and states that the work of removing grades could be done much cheaper while the highways are being repaired.

TAXICAB ORDINANCE ENJOINED.

The Seattle Taxicab & Transfer Company has enjoined the city of Seattle and its police department from enforcing the provisions of the new taxicab ordinance, which makes it unlawful for company agents to enter depots or docks to solicit trade from trains or boats.

The Indianapolis branch of the Eisemann Magneto Company has been moved to more commodious quarters at 415-417 North Capitol avenue.

FEDERAL TRUCK HAULED 30 TONS.

An extremely interesting trial was recently made at Spokane, Wash., of the haulage capacity of a Federal 3000-pound wagon, which served to demonstrate the power of the machine without the "heavy grade" or "rough surfacing" usually sought by those who have tests to make.

In this instance comparison could be made with the same work done with teams of animals, and as a matter of fact the condition created an opportunity that was sufficiently promising to be exploited. Construction now in progress in that city required the use of a number of 30-ton steel girders, and these were hauled from the premises of the builder to the place where the work was being carried on.

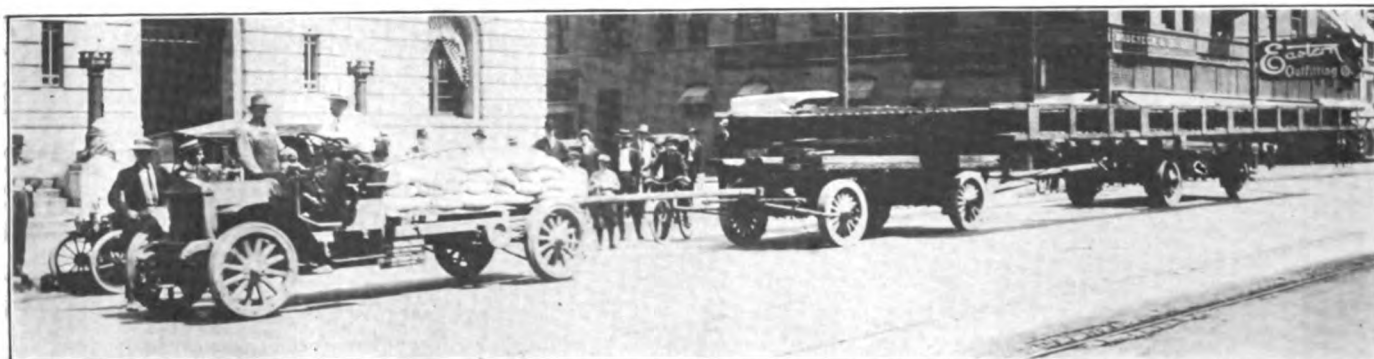
Because of the huge proportions and weight, handling the girders was necessarily slow, loading and unloading requiring a great deal of time, for two big drays were used for trailers, and to rig these so they could be drawn without danger or possibility of accident necessarily required the most careful preparation.

The moving of one of the girders, when all was in readiness, required eight horses and an hour and 20 minutes, this period being the shortest in which the work was done. The day following a Federal truck was tried, it first being loaded with 5000 pounds of cement in bags (an overload of a ton) to insure traction. The distance was short and through city streets with reasonably good surfacing.

The fact that wagons were carrying the load and that they could not be steered well, necessitating extreme care, reduced the speed that might have been made with more favorable conditions, but the actual haulage was done in 20 minutes, the machine having an excess of power with the weight of the load of cement to give it traction.

OLD PLANT FOR CYCLECARS.

The old Grout automobile plant, Springfield, Mass., has been leased by a syndicate of men who will form a corporation for the manufacture of cyclecars and light delivery trucks. The new concern expects to be ready to begin operations about Sept. 1.



Federal 3000-Pound Truck, with 2000-Pound Overload, Hauling a 60,000-Pound Girder at Spokane, Wash., a Work That Required Eight Horses and Four Times the Time.

MOTOR TRUCK CLUB CALLS CONVENTION.

ORGANIZED by the Motor Truck Club of America, an association with the parent body in New York City, a convention of motor truck and wagon interests will be held at Detroit, Mich., Oct. 7-10 inclusive, and endeavor is making to have every organization of importance identified with the industry participate in the assemblage. President George H. Duck of the Motor Truck Club recently visited Detroit and while there proposed the convention to active industrial interests and met with such a satisfactory response that the stated decision was reached and the local organization was perfected.

The Detroit Chamber of Commerce is associated with the club and the arrangements will be made and carried out jointly, but the bureau of convention and tours of the former body will take up the active promotion of the project. Secretary J. Lee Barrett of the bureau has been appointed a representative of the club, and he will be in charge of the organizing, which will be directed by different committees representing the industry. C. H. Norton of the Packard Motor Car Company is chairman of the general committee, M. L. Pulcher of the Federal Motor Truck Company chairman of the finance committee, John H. Thompson chairman of the dealers' committee, W. D. Anderson of the Anderson Electric Car Company chairman of the electric committee, and R. B. Spencer of the Denby Motor Truck Company chairman of the publicity committee.

These committees are local and will be active during the preparatory work, and the programme and the different subjects for discussion will be determined by the regular committees of the Motor Truck Club of America and its associates. The convention has been tentatively outlined, the first day to be "Manufacturers' Day", the second "Dealers' Day", and the third and fourth "Get-Together Days", subject, of course, to such modifications as may be believed desirable.

The Motor Truck Club of America has extended invitations to different organizations to participate, among those invited being the Electric Vehicle Association of America, the Motor Truck Association of Philadelphia, the Motor Truck Committee of the Chicago Motor Club, the Electric Motor Car Club of Boston, the Motor Truck Club of Los Angeles, the Automobile Chamber of Commerce and the Society of Automobile Engineers.

The National Automobile Chamber of Commerce several months ago proposed that a congress of truck manufacturers be held the coming autumn to consider and determine various matters of policy and to take such action as might be agreed upon for the general promotion of the industry. The suggestion apparently has had approval of all interests, but no further action resulted, and the initiative of the Motor Truck Club will undoubtedly result in stimulating interest

and the gathering of a considerable proportion of those who are active in the industry. One of the principal purposes of the convention is to bring together the builders and users of motor vehicles and to bring about a better understanding and more satisfactory co-operation.

The promotive endeavor will be such that there will be elimination of trade competition, for no exhibits will be made and no admission fee will be charged. Invitation will be extended generally to truck owners to take part in the convention. The meetings will take place in the convention hall of the Hotel Cadillac, which will seat 1000 persons. Outside of Detroit and vicinity interest will be stimulated by the manufacturers through their representatives to the users, and by the different organizations that will take active part by canvass of their respective memberships.

The programme for the meetings will include consideration of subjects that pertain to the more efficient and economical use of trucks, standardization of service, the determination of an attitude toward the sales and service problems, and other topics that are of special and timely interest.

The Storle Gas Engine Company, Kewaunee, Wis., is preparing to build internal combustion engines of a new type perfected by O. O. Storle, for stationary and portable purposes. The motor has a new valve arrangement, concerning which little will be divulged until final patents have been applied for and production started.

The American Aluminum Company has purchased for \$400,000 a strip of land in Edgewater, N. J., as a site for a \$2,000,000 plant to be erected in the fall. It will be the largest aluminum manufacturing plant in the United States, it is said, and will employ from 2000 to 3000 men.

A suit in chancery has been brought against 64 stockholders of the defunct Grand Rapids Motor Truck Company by the Grand Rapids Truck Company for the purpose of trying to recover more than \$100,000 due on capital stock subscribed.

The Western Gear Manufacturing Company, Detroit, Mich., has been incorporated with a capitalization of \$5000 to manufacture gears and other motor car parts.

The Gustav Schaefer Wagon Company, Cleveland, O., manufacturer of wagon and automobile bodies, is to erect a three-story addition to its plant, 65 by 70 feet.

NEW YORK TAXI RATE WAR LIKELY.

A rate war between the Mason-Seaman Transportation Company, operating taxicabs, and the new International Cab Company, both of New York City, will probably begin Oct. 1, when the new company will start operations. Statement has been made that the International will charge 25 cents for the first half mile and five cents for each additional quarter mile, making 35 cents for the first mile and 20 cents for each additional mile. Immediately after this announcement the Mason-Seaman company announced that it will put 200 taxis into service at about half the present rate. This will make the tariff 20 cents for the first half mile and five cents for additional quarter miles.

FEDERAL TRUCKS FOR WAR.

Martin L. Pulcher, general manager of the Federal Motor Truck Company, Detroit, Mich., states that his company has received a cablegram from a foreign country now engaged in warfare, asking how soon the Detroit factory could ship 100 trucks to one of its ports. Mr. Pulcher says that he is not at liberty to mention the name of the country. He replied that the Federal company could fill the order very shortly, but shipment might possibly be delayed owing to conditions of commerce. This nation, says the Federal manager, is now using 42 Federal trucks in its hospital service and to carry wireless apparatus.

MASON-SEAMAN COMPANY.

The question of issuing securities by the consolidated Yellow Taxicab Company and the Mason-Seaman Transportation Company, both of New York City, was brought up at a recent hearing of the New York Public Service Commission. A mass of documentary evidence was submitted to Presiding Commissioner Wood and Henry B. Twombly, who represented the company, told the commission that it did not have jurisdiction in this particular case. The matter involves the legality of issuance, a point raised by the commission.

To support his contention, Mr. Twombly cited a similar case recently decided by Supreme Court Justice Seabury, which was affirmed by the appellate division of the supreme court. George S. Coleman, counsel for the commission, was instructed to prepare a brief on the case and adjournment was taken until Sept. 7.

'BUS LINE FOR ARGENTINA.**Passenger and Freight Services Projected for Numerous Sections of That Country.**

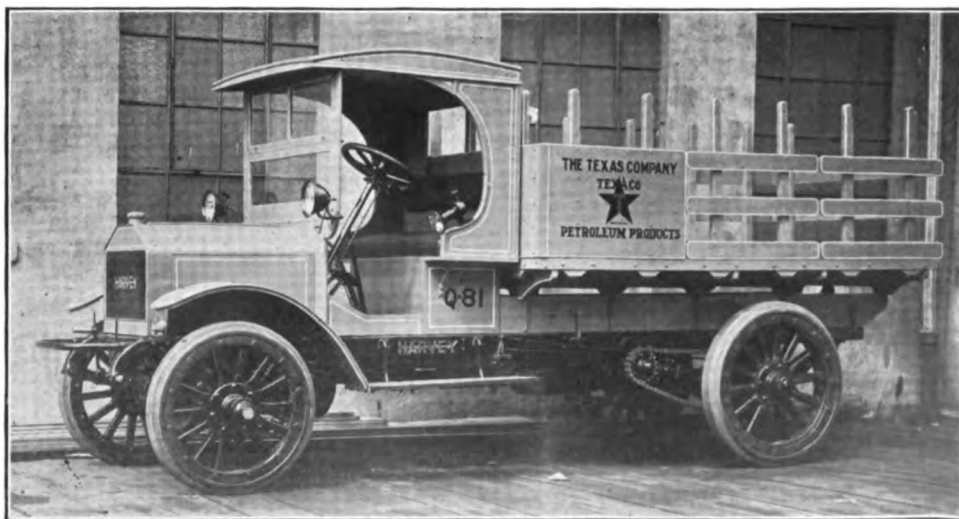
Several projects are under way in South America for the establishment of a number of motor 'bus lines in that country. The first new project will be a motor 'bus line from Tucuman to Aconquija Park, both in Argentina.

The minister of the interior of Argentina at Buenos Aires is working out a plan for the establishment of a service of motor wagons for cargo transport in the national territories of that country. It is purposed to run this service through the tobacco growing districts of San Javier and Tacaruare in the territory of the Misiones. Tobacco cultivators in these regions frequently lose their crops because of the lack of adequate transportation facilities. Another service is projected for the transport of products of Cholina and Crumayo to Maganichao, the present terminal station of the railway from San Antonio to Nahuel Huapi.

The representative of a foreign firm is at present in Asuncion, Paraguay, treating with the government for facilities for the establishment of a motor 'bus service between the capital and outlying districts.

A chauffeur of Columbus, O., who invented an electrical automatic device for signalling to traffic policemen, has sold the patent rights to the Peerless and Pierce-Arrow motor car companies for \$5000. The letter S flashes out when the course is straight ahead, the letter R when a turn toward the right is desired and the letter L when it is proposed to turn toward the left.

A. H. D. Altree, former manager of the Chicago branch of the Bosch Magneto Company, has been appointed vice president of the company with headquarters in New York. F. D. Norman has been transferred from Toronto to the Chicago branch.



Harvey Truck, Capacity 3000 Pounds, Fitted with Stake Body, Equipped for the Texas Company for Use at Chicago.

TIRE MANUFACTURERS INCREASE PRICES.

PRICES of both pneumatic and solid tires have been increased from 10 to 20 per cent. as the result of the European war. This was the first direct effect felt by the automobile and motor truck industry. The first company to announce an increase was the Goodyear Tire & Rubber Company, Akron, O., which advanced prices a straight 20 per cent. on both pneumatic and solid tires. The Firestone Tire & Rubber Company, Akron, O., followed with a 15 per cent. increase on pneumatics and 10 per cent. increase on solids. The United States Tire & Rubber Company raised prices on pneumatic tires $12\frac{1}{2}$ per cent. and on solid tires 15 per cent. The Fisk Tire & Rubber Company, Chicopee Falls, Mass., increased 15 per cent. on the pneumatic price list, and the B. F. Goodrich Company, Akron, O., advanced prices on pneumatic and commercial vehicle tires $12\frac{1}{2}$ and 10 per cent. respectively. All increases were effective Aug. 8, except the Goodyear company's, which went into effect Aug. 7.

Some of the companies that later announced increases are the Empire Rubber & Tire Company, Trenton, N. J., which made a $12\frac{1}{2}$ per cent. advance, effective Aug. 11; the Batavia Tire & Rubber Company, Batavia, N. Y., that increased prices 15 per cent., effective Aug. 8, and the Federal Rubber Manufacturing Company, Milwaukee, Wis., which advanced its prices $12\frac{1}{2}$ per cent. The Kelly-Springfield Tire Company states it will not change its list, and the Michelin company states that no increase is expected. The Lee Tire & Rubber Company has made no increase to date, and the Overman Tire Company announces that no increase will be made at present.

The Pennsylvania Rubber Company has increased its price for pneumatic shoes $12\frac{1}{2}$ per cent. pending adjustment of prices, and McGraw tires will probably be advanced in the near future. The Racine company has made no change as yet, and the Swinehart Tire & Rubber Company has made no raise, but to the contrary has cut 10 per cent. from the dealers' and consumers' discounts. The Republic Rubber Company has increased its prices from $12\frac{1}{2}$ to 15 per cent.

Quick Advance of Rubber.

The war caused a 55 per cent. increase in the price of crude rubber and for the first time in history "far eastern", or Ceylon rubber is selling at figures higher than those commanded for the supposedly superior Para grades. However, strictly speaking, the increase is in excess of 55 per cent., as a month ago consumers had no difficulty in getting Ceylon rubber in any quantity for 55 cents per pound. The price is approximately \$1.10 per pound, an increase of over 100 per cent. in a month. The immediate increase, as shown by comparative quotations, is from 70 cents to \$1.10 per pound. The price of Para rubber has advanced from 55 cents per pound to \$1.08 per pound in the past few weeks.

Viewed in a broad way, the situation is not a serious one, so far as the tire manufacturers are concerned. America can send to South America and not only get her ordinary share, but take the European supply. The European war does not stop rubber production in South America, and neither does it stop the United States from purchasing this rubber. The Purus, of the Lloyd Brazilian fleet of 72 ships, all flying the flag of Brazil, and which is owned by the Brazilian government and financed by the English branch of the Rothschild family, has been ordered to pick up a great rubber cargo for New York with an advanced war freight rate of $33\frac{1}{3}$ per cent. Although the Purus already has 30,000 bags of coffee on board for New York, on which a freight rate of 60 cents a bag is paid, she has room for several thousand tons of rubber.

Views of Tire Manufacturers.

Horace De Lisser, chairman of the board of directors of the Ajax-Grieb Rubber Company, says that when the situation is relieved, that is, when shipments become freely possible, the price of rubber will go lower than ever before. This is because the stocks to be shipped will have increased greatly, as the trees will naturally keep on growing, and yet there will not be the same market for the rubber, inasmuch as the foreign market will not be in a position to absorb much if any, of the rubber. The Ajax company has not increased its tire prices and Mr. De Lisser states that prices will not be increased on any tires in stock, or on tires yet to be built from crude rubber on hand.

The Fisk Rubber Company, Chicopee Falls, Mass., announces that the output will be reduced, and the plant run on part time.

The Revere Rubber Company, Providence, R. I., which is owned by the United States Tire Company, posted a notice to the effect that it is curtailing its production. The company has been operating double time for more than a year, manufacturing automobile tires and rubber tread. The night shift has been stopped and the day shift will be gradually curtailed until the situation becomes easier.

At a special meeting of the directors of the American Road Builders' Association, it was decided to hold a joint convention or congress with the American Highway Association at San Francisco or Oakland during the Panama-Pacific exhibition.

Stockholders of the United States Motor Truck Company, Cincinnati, O., increased the capital stock from \$25,000 to \$300,000 to take care of the increasing business.

G. L. Willman has been appointed advertising manager of the Studebaker Corporation, Detroit, Mich.

SAURER SPRINKLER DOES GOOD WORK.

A 6½-ton Saurer street flusher and sprinkler, placed in the Loop district of Chicago last September by the Citizens' Street Cleaning Bureau, has given excellent service. This machine is built by the International Motor Company, New York, N. Y., and owing to the open winter it has been used day and night since last fall, with the exception of about 60 days.

A 1500-gallon water tank is mounted on the chassis, which delivers water by gravity to a centrifugal pump, the capacity of which is 270 gallons per minute. This pump is connected to the motor by two sprockets and chains of silent type. The pump speed is the same as the engine speed. The gasoline consumption of the truck averages 15 gallons per night and about three quarts of oil are used. The work of three wagons of the old type is done by this truck.

TRUCKS FASTER THAN TRAINS.

Experiments to determine the value of the motor truck were recently held in Burlington, N. J. Produce was carried by the experimental trucks to the markets in New York City and Philadelphia, the latter 20 miles distant. These trucks started from the farms in the afternoon and delivered their loads in New York about midnight, which was before the train shipments arrived. The loads consigned to Philadelphia arrived early in the evening. Because of economy of haulage and the arrival of the loads in better condition, it is believed that the motor truck will be more generally adopted.

MORELANDS IN DESERT SERVICE.

The establishment of a freight service running on regular railroad schedule between the fertile Imperial valley and San Diego, Cal., is to be obtained by the establishment of a motor truck line. Six 2½-ton Moreland trucks have been bought for this route, 122 miles long, most of which is over mountain roads, and the first portion of the westward trip is made over a part of the Imperial desert, which has not been reclaimed.

Heavy losses have been sustained by the farmers, as many of the farms are 30 miles from the railroad station, and too much time is consumed in hauling the goods to the railroad and waiting for freight trains to carry it to San Diego. The new motor truck route will eliminate all waste of time, and goods will be carried into San Diego so they may be sold for the best prices.

BOURNE BILL FAVORED.

Approved by the Senate Committee, It Is Now Ready for Consideration by Congress.

The Bourne good roads bill, submitted as a substitute for the Shackelford bill, has been reported favorably by the Senate committee on post roads. This amended bill proposes to create a United States highway commission to have an advisory voice in the expenditure of the highway funds in the different states of the Union.

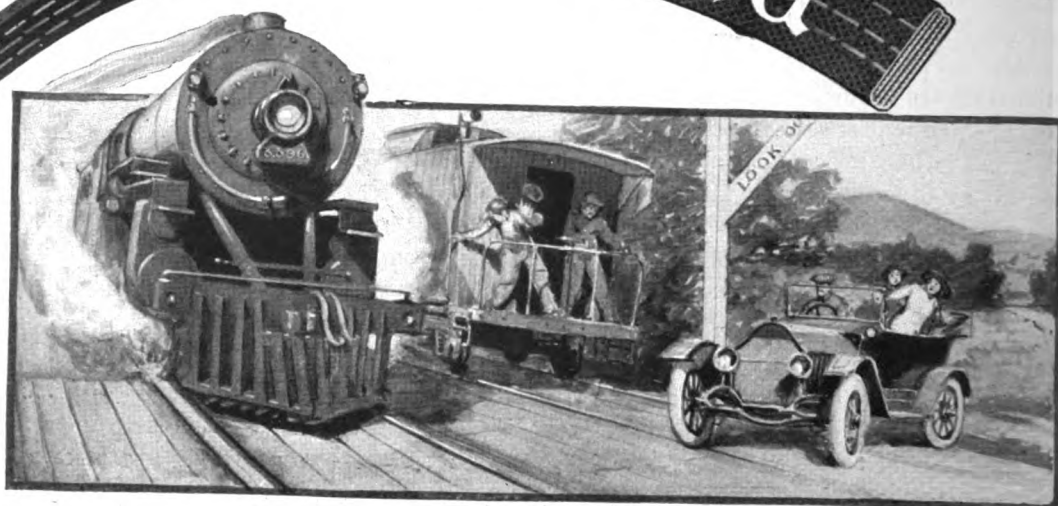
Under the terms of the Bourne bill the original \$1,000,000,000 bond issue is cut to \$500,000,000. It contemplates the issue of \$100,000,000 United States bonds, either coupon or registered, each year for five years, the bonds to draw three per cent. interest and to run for 50 years. States desiring to co-operate may apply and receive the proceeds from these bonds in exchange for a like amount of state bonds, to run for the same period, but to draw four per cent. interest. The one per cent. interest margin on the state bonds is to be devoted to the creation of a sinking fund in the federal treasury for the final redemption of the federal bonds. The government is pledged to appropriate two per cent. of the bond issue in cash for maintenance of highways built in pursuance of the plan. Federal bonds will be issued in denominations of \$20, or multiples thereof, and offered to the public at par.

Indiana will spend \$3,000,000 this year for concrete roads, bonds having been issued for this purpose. This is exclusive of a number of smaller issues made by separate counties. Washington township alone spending \$400,000.

L. I. Barnes has joined the sales organization of the Federal Motor Truck Company, Detroit, Mich., and will have charge of the sales and development of the Federal business in the South.



Palmer-Moore 1600-Pound Delivery Wagon, with Open Express Body, a Standard Type of Stock Equipment.



When Disaster is Near—Thermoid Holds!

You can *trust* Thermoid Brake Lining.

Suit yourself on make of car. You are pretty sure to get good value. But be firm on the matter of brake lining. Brake lining is a small thing—until Death dances in the right of way. Most good cars are equipped at the factories with Thermoid. That's because automobile builders and engineers *know* that Thermoid is absolutely reliable. If these makers don't dare to experiment with other brake linings, is it wise for you to be indifferent when your brakes are relined?

Insist at the garage that Thermoid be used. Examine it yourself and see that the trade-mark is stamped on the goods. Don't drive your car another day until you know that Thermoid lines the brakes.

And when you buy a new car be assured that Thermoid is in the brakes. Take that precaution for the sake of those who are to ride in the car.

The base of Thermoid is pure Canadian asbestos, interwoven and reinforced with solid brass wire. While in a comparatively loose state, this base has rolled into it, by giant rolls, a wonderful friction compound which impregnates and coats every asbestos fibre. Then the whole mass is hydraulically com-

Thermoid

HYDRAULIC COMPRESSED
Brake Lining - 100%

pressed—a compression of 2000 pounds—which reduces it to a solid, hard, practically indestructible substance—Thermoid.

It is a brake lining all through—efficient until worn as thin as paper. Thermoid cannot be burned out. It cannot dry up and crumble. It cannot crack. And it wears indefinitely—so long that it is an economical brake lining, although surely no one will think of the *cost* of brake lining!

Every garage in the country has Thermoid—or can get it.

Our guarantee—Thermoid will make good—or we will.

THERMOID RUBBER CO.

Trenton, N. J.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., SEPTEMBER, 1914

No. 9

WHOLESALE DELIVERY BY PIERCE-ARROW TRUCKS.

Five-Ton Machines Afford Large Economies for Grocery Distributors and Materially Increase the Volumes of Business for Owners---High Efficiency and Endurance Demonstrated by Constant Work in Widely Varying Conditions.

CONSISTENCY of service, no matter what the condition of use, is an unfailing measure of quality. When this is applied to motor trucks, and specifically to the transportation equipment of a considerable number of concerns, which are used for the same general character of work in widely separated localities and with administrations and organizations that are absolutely independent and apart from each other, one will understand that a uniformity of satisfaction cannot result from adherence to method or system. There can be but one conclusion when one knows that these

usually incidental, the expense of operation is seldom carefully kept, and maintenance is not often systematic. This statement is intended to emphasize the fact that only in extremely rare instances will a small transportation equipment be found that will compare favorably to the larger, with reference to efficiency and economy. But where an exceptionally economical small service exists system of operation and of record are predominating factors.

This consistency of service is a particularly illuminating characteristic of the delivery departments of



Some of the Fleet of Seven Five-Ton Pierce-Arrow Trucks Driven from 60 to 80 Miles a Day, in the Service of the T. C. Jenkins Company, Pittsburg, Penn.

firms are all operating one make and practically one type of machine.

The work done with motor trucks utilized by owners of large equipment must, because of obvious reasons, be more economical than where the number of vehicles is small. Transportation departments of considerable proportions are always better organized and more closely supervised, and accounting methods insure more intimate knowledge of operating cost and haulage efficiency. When the requirements are such that the number of units are few, the supervision

more than a score of firms engaged in the sale and distribution of groceries at wholesale, which are located in a considerable number of cities of large size, including New York, Philadelphia, Cleveland, Cincinnati, Pittsburg, Jersey City and several smaller municipalities, all of which are using Pierce-Arrow motor trucks, generally of five tons capacity. Without exception the owners are agreed that the machines are not only satisfactory from the viewpoint of mechanical construction and endurance, but they have proven to be extremely economical.



Five-Ton Pierce-Arrow Truck, Owned by John Scott & Co., Philadelphia, Penn., Driven More Than 30,000 Miles in Three Years.

The statement has been made generally with regard to quality, yet it is supported in every case by the owners, not with any reason to economize truth or fact, but based on experience ranging from a few months to several years. As a matter of fact one of the firms purchased the first Pierce-Arrow truck sold, so one can understand that the period of time is the longest that could be found in the inquiry into the utilization of these machines and the results obtained with them.

In making this general survey of a single make of motor truck in what may be regarded as one class of service, one fact has especial significance, and that is extreme variability of the requirements. Were the conditions alike or practically at parity, more general uniformity of results might be anticipated, but with the work so widely varying one could naturally look for different degrees of productiveness—at least instances where there might be uncertainty. Yet without exception each owner believes that the investment has been wisely made and that substantial benefit has been realized by motor vehicle haulage.

To understand thoroughly the application of the words consistency and satisfaction, it is well to consider for a moment the variability of the operating conditions. In New York the greatest traffic congestion of the nation must be dealt with, for practically all the wholesale establishments are in the lower section of Manhattan Island, where the streets are narrow and are filled with vehicles at all times of the working day. In the highways the progress of the trucks must be limited by the movement of the traffic, and retardation for any cause means the material reduction of the utility of the machines and consequently lessened value of speed and load capacity.

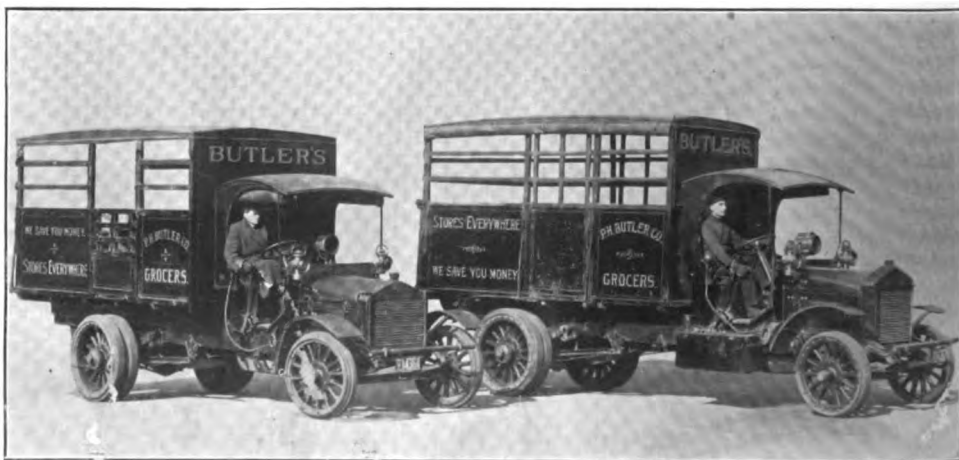
In Philadelphia the streets of the old section are narrow, many of them being restricted to "one way" only for traffic, and the newer portions and the suburbs are hilly. The street congestion is pronounced in some sections, and the paving as a rule is what might be termed very poor. Pittsburg is situated in a river valley with steep hills at either side, and from the business centre streets radiate in different directions. There are few cross streets between these main channels for vehicles and this necessitates what seem to be unnecessarily long distances for the delivery of loads that consist of several or a number of orders, unless the load is with reference to the deliveries, and in one locality only.

Cincinnati is similarly located in a valley and the business section is along the Ohio river front. In this city and Pittsburg the street traffic is not congested by narrow highways to the same extent as in Philadelphia and New York, but the haulage is with rare exceptions up varying gradients, which means large fuel consumption in normal operating, especially in wet weather or in snow or when the streets are covered with ice.

Traffic Conditions Widely Vary.

Cleveland is better topographically than either Pittsburg or Cincinnati, and while there are steep ascents from the immediate lake front, the city is fairly level and the streets are usually wide and are not often greatly congested. Jersey City's streets are used by a greater volume of traffic than are those of cities of this size, because of the railroad and steamship terminals that attract vehicles from Manhattan Island and from other sections of New York and from immediate towns and cities of New Jersey. The grades, however, are by no means as severe or as continuous as they are in the western municipalities referred to.

The operating conditions so far as they relate to topography have been mentioned that the reader shall understand that these necessarily influence cost of operation and affect the work that can be done in a given period of time. Business hours and the working time of the men can be regarded as practically uniform. But aside from these conditions, there



Two of the Three Pierce-Arrow Trucks Operated by the P. H. Butler Company, Serving a Chain of Stores at Pittsburg, Penn.

are innumerable reasons for variance of results.

One can direct attention to the fact that in practically every instance the different firms have carefully developed accounting systems, and these have been applied to haulage equipment operating, so there is accurate knowledge of work done and expense, and, generally, means for making comparison with the cost of operation prior to the use of motor vehicles. Too great stress cannot be placed on the value of precise information when economies are sought.

The firms are engaged in what may be considered as different classes of business, operating chains of stores, serving customers who purchase regularly and occasionally, and general transfer work. In some instances these concerns operate Pierce-Arrow trucks entirely, others use them as a part of their transportation equipment, either with other motor vehicles or with animal wagons and trucks, and the number ranges from one to nine.

Regarding the factors that justify their use, these include greater radius of distribution, the development of new customers and the increased patronage of the old, the possibility of affording the same character of service in suburbs as in the cities, saving of time, lessening of handling, reduction of cost of packing, minimized damage, and the advantage of dealing direct with patrons. All of these are items that in the aggregate will represent a considerable amount, either in increased profits or reduced expenditure.

Quick Delivery Means Increased Orders.

With the increase of the area in which distribution can be made direct the development of new business is generally of material importance, while the larger purchases of firms with whom relations were previously established is equally important. Quick delivery means the better satisfaction of the retailer and his customers, and is extremely productive of increased orders.

Where orders were previously sent by express or



Two of the Four Five-Ton Pierce-Arrow Trucks Used by the Joseph Campbell Company, Camden, N. J.

freight, these were often shipped at stated dates or to meet the individual requirements, such shipments necessitating careful packing, haulage to the freight terminal, haulage and unpacking by the customer, with the need of greater time, with increased cost, and with the shortages and loss by damage to be deducted from the profit. Where dealings are with retailers the cost of transportation is usually paid by the wholesaler, and this item often reaches a large aggregate in a year.

While capacity loads are undoubtedly the most profitable, there is no doubt that the comparatively small order can be delivered at minimum cost by careful routing, and without materially increasing the expense of the large orders by the greater time required for the truck. The experience with the concerns included in this statement has been that the five-ton truck is not too large, and that capacity loads are carried so far as is possible. In but two instances are smaller machines utilized, and these are owned by concerns that have from two to eight five-ton Pierce-Arrow trucks. These vehicles are of two-ton capacity.



The Five Five-Ton and One Two-Ton Pierce-Arrow Trucks Used for Delivery by Arbuckle Brothers at the Brooklyn, N. Y., Refinery—This Company Purchased the First Machine Sold.



Two of the Three Five-Ton Pierce-Arrow Trucks Utilized by the National Grocery Company, Jersey City, N. J.

The trucks are maintained in private garages and public service stations, according to the judgment of the owners which of these is the more economical. Generally speaking, there is greater economy in the private garage only when the equipment is of sufficient proportions to justify the hiring of a mechanic who can devote his entire attention to the machines, and who is competent to efficiently maintain them. The point where the service station expense is more than that of maintaining the private garage and its organization is largely dependent upon circumstances, so that no definite number of vehicles can be named as that when the one form of maintenance can be advantageously changed for the other, but many of the concerns owning from one to three have public station storage and depend upon the drivers to deal with conditions ordinarily met with. Repairs of magnitude or importance and overhauling is done by the service stations of the Pierce-Arrow agencies, where the machines are handled by experts, who make certain and satisfactory restoration or repair.

Relative to the efficiency of the Pierce-Arrow trucks, this can only be determined by one measure—a comparison of the cost of a work with the expense of similar work done by other means of transportation. There is a limit to the distance that profitable distribution can be made by motor trucks because of the unproductive mileage that cannot be obviated, and this is logically measured by the value of time. If actual cost is the principal factor, then the object is to transport a given weight a given distance without reference to time. But if time is the real desideratum, then the purpose is to reduce this to a minimum and, naturally, at the least cost. But the experience has been that the motor truck

is more economical than the railroad up to 30 miles, if time is valued, and in some instances considerably in excess of this distance.

The first Pierce-Arrow truck sold, No. 3, was purchased by Arbuckle Brothers, Brooklyn, N. Y., June 2, 1911. This concern operates a large sugar refinery and does extensive business in coffee. There is a branch at Pittsburg operated as the Arbuckle Brothers Company. Previous to the date stated the company had never used a motor truck of greater capacity than three tons, and prior to using machines the delivery department equipment included 500 horses. Shortly after the delivery of the Pierce-Arrow truck the Brooklyn plant was much damaged by fire and the truck was shipped to Pittsburg. In October, 1911, the company bought three more Pierce-Arrow trucks, in January, 1912, two more, and since then three others, one of which is a two-ton machine, making nine in all, and of these three, all five-ton capacity, are used at Pittsburg.

Trucks Reduce Horses from 500 to 68.

The Brooklyn plant of the company now has in service 68 horses, which are used for hauling within very short distances of the refinery, and 17 motor trucks, and aside from the Pierce-Arrow machines all are different makes save two. The company has purchased no other trucks since buying the Pierce-Arrows, except three of larger size, which were acquired with the idea of hauling material more cheaply on a ton-mile basis. One of these is a tractor with capacity of seven to eight tons.

At Brooklyn the company maintains its own garage and the machines are very carefully maintained. The mileage, of course, depends entirely on the work that the trucks are used for, but No. 3, the machine now at Pittsburg, has been operated practically an average of 50 miles daily, and the aggregate distance driven is now in excess of 45,000. This is, of course, the largest mileage of any of the company's Pierce-Arrow trucks, and this daily work is probably not exceeded.

The company keeps extremely accurate record of the work done by each machine and the expense, and comparisons determine the relative economy of each



Three Five-Ton Trucks That Are Giving the Best of Satisfaction for the ACME Company, Which Has About 250 Retail Stores at Philadelphia, Penn.

Five-Ton Trucks That Are Giving the Best of Satisfaction for the ACME Company, Which Has About 250 Retail Stores at Philadelphia, Penn.

size and make of vehicle. The intention is to learn from actual operation what type and capacity can be operated most productively, and this can only be done by experience with the different machines in their service. Economy is necessary and the means are chosen from results only. The company has now in its service nine Pierce-Arrow trucks, or practically half its equipment. This is the best answer that can be given to the question of what makes and sizes of vehicles have been the most productive. The constant reduction of the number of horses and the substitution of motor trucks is also indicative of the superiority of this form of equipment.

Economy of Both the Long and Short Haul.

But the statement will be made that this is an exceptional instance, that the loads are large and the hauls are long. One can turn to the installation of the T. C. Jenkins Company, wholesale grocer at Pittsburgh, which is now using seven five-ton Pierce-Arrow trucks in general delivery. Previous to purchasing the first of these machines the company used three other makes of trucks, so that it had very good experience on which to base judgment. Since the first Pierce-Arrow was placed in service no other make of machine has been bought. This company is making regular daily deliveries within a radius of about 20 miles from the centre of the city, carrying capacity loads and covering from 60 to 80 miles a day. While the loads are carefully routed and the work systematized with a view to obtaining the greatest economy, frequently as many as 35 stops are necessary to deliver a five-ton freight, this averaging about 285 pounds to a delivery.

From this illustration of widespread distribution, of comparatively small deliveries and numerous stops, which may be regarded as diametrically opposed to that of Arbuckle Brothers, one may learn that the material advantage is increased radius of delivery, quick service and development of business. The real economy of motor trucks has been conclusively established with both of these concerns.

The Great Atlantic & Pacific Tea Company, a corporation, probably operates the largest number of retail stores in America, if not in the world, there being



One of the Two Pierce-Arrow Trucks of Daniel Reeves, Inc., New York, N. Y., Which Distribute Stock to About 70 Stores.

about 800 of these throughout the country. The distribution of stock is largely made from warehouses in New York and Jersey City, and from Jersey City no less than 360 stores are supplied with stock either by motor truck or animal transports. This company purchased two Pierce-Arrow trucks last February, and since that time has added three others, all of five-ton capacity. The trucks are operated conventionally, but the company is very careful with regard to accounting, for minimized expense is the only purpose to be obtained. Usually two deliveries are made to a load and the mileage will average about 55 daily. But about four hours of the day's time are required for loading, and with the desire to save practically all of this experiments are to be made with interchangeable bodies. One of the trucks will shortly be so equipped. It will have two bodies, which will be drawn on or off the chassis by an endless chain manually operated. The bodies will have what are essentially runners, which will slide in channels on top of the side members of the chassis frame, but they will also be mounted on six caster wheels, three on a side, on which they can be moved about the warehouse and the loading platform. The purpose is to load the bodies in the warehouse and to change the empty body for one that is loaded, an operation that is expected to take five



Two Five-ton Pierce-Arrow Trucks That Save 25 Per Cent. of the Cost of Distribution of Stock to the Stores of the Fisher Brothers Company.



Five-Ton Pierce-Arrow Machine That Makes Saving of 50 Per Cent. for Flach Bros., Cincinnati, O., in Delivery of Suburban Orders.

minutes, so that a third trip can be made. This will increase the mileage approximately 50 per cent. and proportionately add to the operating expense, but it will equally develop the productiveness without increasing the fixed charges or the driver's wages. Obviously interchangeable bodies would not be as practical with animals.

The National Grocery Company, Jersey City, is now using four five-ton Pierce-Arrow trucks, the first of which was purchased two years ago, and the result with the initial machine was such that the others were acquired. The work is delivering capacity loads to points within a considerable radius, and the statement is made by this company that no other form of transportation would have the same efficiency or economy. The Joseph Campbell Company, Camden, N. J., manufacturer of soups, uses four Pierce-Arrow five-ton trucks for transfer of freight between the factory and the different shipping terminals and wholesale houses and large customers in that city and Philadelphia and vicinities.

The Acme Tea Company, Philadelphia, which operates more than 250 retail grocery stores in that city and its suburbs, has utilized motor trucks very generally in distributing stock to these stores from its warehouses. Economical haulage is the first and last word with this concern. It has satisfied itself beyond question that motor vehicles are the cheaper and the better form of equipment, but it has experimented to a considerable extent with differing makes and types of machines with the purpose of obtaining that which will be the best adapted for its service. The principle of accounting that has made

possible the development of the business has been applied to the transportation department, and the work and the expense are computed with extreme exactness. The company depreciates its motor trucks 45 per cent. of the cost for the first year, 20 per cent. for the second and 10 per cent. for the third, and at the expiration of that time the machines are assumed to be worth the remaining 25 per cent. The superintendent of the transportation department then has the option of disposing of the trucks at the depreciation value and replacing them with

new, or of restoring them to the height of efficiency, his judgment being accepted as final.

Repair and Maintenance Expense.

Pierce-Arrow truck No. 236 was delivered Aug. 15, 1912, and trucks Nos. 233 and 243 were delivered Aug. 20, 1912. The repair charges against these machines to Aug. 1, 1914, were \$971.47 for No. 233, \$1300.24 for No. 236, and \$795.72 for No. 243, for work that was done by the Pierce-Arrow agency. Only one of these machines has been overhauled since service was begun, another is now being completely restored after being driven between 34,000 and 35,000 miles, and the third will be given an overhaul shortly. This has been driven about the same mileage as the second mentioned. It will be noted that the repair cost on No. 236 includes an overhauling. The inference is gained from the information obtainable that these trucks are operated for less than any other five-ton vehicles in the equipment.

Jones Brothers Company, New York City, wholesale tea dealers, operates three Pierce-Arrow five-ton trucks, and relative to these the company makes the



Pierce-Arrow Five-Ton

in the Service of Robinson & Crawford, Philadelphia, on a Very Low Maintenance Cost.

statement that the machines are giving it entire satisfaction. Compared to team trucks for long hauls and heavy work they are found to be very profitable. The great bulk of the goods handled are received at the Jay street terminal, which is about two blocks from the warehouse, and about 90 per cent. of the shipping is done from the same terminal, and for these short hauls team trucks are as profitable as motors. The trucks average about $5\frac{1}{2}$ miles to the gallon of gasoline and adjustments on tires have been made on an approximate basis of six cents a mile. The company summarizes its knowledge of motor truck economy in the sentence: "We find that in our business we can make a motor truck pay for itself in about two years' time".

Trucks Make a Large Saving.

A very remarkable experience is that of the Fisher Brothers Company, one of the largest wholesale grocery houses in Cleveland, O., which operates a chain of about 30 stores in that city and vicinity. M. F. Fisher, president of the company, makes the following statement relative to the transportation:

"We own two Pierce-Arrow five-ton trucks, the first having been delivered to us Nov. 28, 1913, and the second in February, 1914, which have been worked continuously since, and have not been laid up one minute for repairs of any nature. Of course we have had tire changes, but I want to say that these trucks have not cost us one cent outside of gasoline and oil since we have had them. Four times every day each truck leaves our warehouse, loaded to capacity, and makes a round trip of approximately 10 miles, discharging its load in four stops. To do this work, it was necessary formerly to employ six two and three-horse trucks.

"In going over my delivery costs, I find that under present conditions (which I know are not as efficient as will be the case when we are in our new warehouse, with the loading platforms on a level with the truck bodies), we have effected a saving of practically 25 per cent. over the former cost to deliver, and this with only two trucks. We are contemplating the addition of another truck shortly, as I was astonished to observe that our few remaining teams were costing us an amount away out of proportion to that of the trucks.

"I am firmly convinced that our present method of employing two men per truck, together with efficient loading facilities, such as we are arranging for, and using Pierce-Arrow truck equipment all

should decrease our cartage expense 40 per cent. or more".

The P. H. Butler Company, Pittsburg, wholesale grocer, has three Pierce-Arrow five-ton trucks in constant use in distribution over practically the same area in which the Arbuckle Brothers Company uses its machines, and with excellent satisfaction. The Childs Grocery Company, Camden, N. J., includes in its transportation equipment two Pierce-Arrow five-ton trucks which are used for long hauls, and these are driven as far as Atlantic City, 65 miles, in one direction, and to Pottstown, Pottsville and other Pennsylvania cities equally distant. These machines make about the same average mileage and do about the same work as those of the Acme Tea Company.

Daniel Reeves, Inc., until two years ago operated about 35 retail grocery stores in New York City. Then he purchased a five-ton Pierce-Arrow truck. A year later the second machine was bought, and now the delivery from the warehouse to about 70 stores is done by these two trucks and a two-horse truck. If present



One of the Five Pierce-Arrow Five-Ton Trucks Used by the Great Atlantic & Pacific Tea Company, Distributing Stock from the Warehouses at Jersey City, N. J.

plans are realized another truck will be acquired about the first of the year. The statement is made by James Reeves that the firm not only would not but could not do without its trucks. The machines are operated at a cost of about \$90 a week each and each does the work of at least three animal teams.

Truck Operating Cost \$102 a Month.

Andrew Davey, who has a chain of retail grocery stores in New York City and vicinity, has a single Pierce-Arrow five-ton truck in service which was delivered Oct. 1, 1912. Up to Aug. 1 the truck expense, aside from wages and garage storage has been \$2444, or an average of \$102 a month for 22 months. The truck had been driven an average of 50 miles each working day, and during that period was out of service one day and a half to replace engine bearings which were ruined through carelessness of the driver, who per-



A Five-Ton Pierce-Arrow Truck That Has Been Found Indispensable by A. Lowry & Bro., Philadelphia, Penn.

mitted the oil to escape. The truck does the work of more than three two-horse teams, and is regarded by the owner as equal to eight horses. The work of this machine has resulted in an order for another. Mr. Reeves states that the truck could not be bought for twice the original cost if it could not be replaced.

F. J. Shannon & Co., Yonkers, N. Y., wholesale grocer, has a Pierce-Arrow five-ton truck in service that has been operated more than 11,000 miles, or 1000 miles a month, and the company states that the only thing that can be said of the machine is in praise.

The truck of the United Grocery Company was placed in service Dec. 1, 1911, and has averaged 50 miles a day between the store and the freight house, carrying capacity loads, has not been out of service and \$10 will cover the repairs. The Peninsular Naval Stores truck was first used June 1, 1912, and has been used 35 miles daily since that time and has never been idle from accident or failure. The repair cost has been thus far \$4.90. Both concerns are at Jacksonville, Fla.

Colter Company's truck has been driven more than 22,000 miles in two years, and the motor has never been touched, having the original spark plugs, and the valves have not been reground nor has the carbon been removed from the cylinders. The company states that the operating cost is \$12 a day and that it affords a saving of 28 per cent. as compared with horses. It is



Five-Ton Pierce-Arrow Truck of the F. J. Shannon & Co., Yonkers, N. Y.

used for suburban deliveries and hauls 20 tons of groceries a day. This firm is at Cincinnati, O.

The five-ton truck owned by the Flach Brothers Grocery Company, Cincinnati, O., has developed much suburban business and by saving the handling of goods that were formerly shipped by freight has resulted in an economy of 50 per cent. in this work.

Four days a week for suburban deliveries and two days in freight haulage and city deliveries, is the general outline of work by the truck owned by A. Janszen & Co., Cincinnati, O., which has replaced five animal vehicles. The machine obviates the delays resultant from hard work on the hills in hot or icy weather.

The five-ton truck of John Scott & Co., Philadelphia, has been driven more than 30,000 miles in three years, largely in suburban delivery in a very hilly section, it being used for this work in preference to another make of truck of similar capacity owned by the firm.

The statement from Alfred Lowry & Bro., Philadelphia, Penn., is that it is extremely satisfied with its truck and the machine has been found indispen-



Truck of Colter Company, Cincinnati, O., Driven More Than 22,000 Miles Without Changing a Spark Plug.

ble. The mileage is not as large as are those of some other trucks because the business does not require it.

The report of the truck owned by William Montgomery & Co., Philadelphia, Penn., is that this was one of the first machines delivered and that in constant service it has been found extremely satisfactory and economical.

The five-ton truck operated by Robinson & Crawford, Philadelphia, Penn., has been in constant use since delivery, carrying heavy freights, and it has been maintained for a surprisingly small charge for repairs.

The two-ton truck owned by D. B. Stewart & Co., Ithaca, N. Y., is used on a one-mile haul, loaded practically all the time. The truck carries two helpers besides the driver (the helper helps loading and unloading), and from 70,000 to 80,000 pounds a day, which is about what two teams can do, because of the greater loads that can be hauled by them. The truck is found to be a more profitable means of transportation because it costs no more to operate than the animal teams and it expedites the whole process of shipping as well as relieves the congestion at the receiving dock.

MOTORCYCLES TO COLLECT MAIL.

A recent order of the postal authorities in canceling its contract for the motor collection of mail by the Johnson Motor Service Company of Milwaukee, Wis., has caused considerable criticism from those who regard the motor car as superior for such use. They find consolation in the fact that the motor will still be employed, though in the form of motorcycle vans.

A postal authority states that if the experiment with motorcycles proves satisfactory this form of vehicle will be adopted all over the United States. Three machines have been installed in Milwaukee and one of these has made a collection from one box in 14 seconds. For the delivery and collection of small packages motorcycle trucks have been used extensively and are opening a field for such vehicles all over the country.

MINERS CO-OPERATIVE AMBULANCE.

The miners employed by a Castleford, Yorkshire, England, colliery recently raised a sufficient amount of money to purchase a motor ambulance to be used exclusively for their benefit, and rather than have any question arise as to their jurisdiction and control of its use refused the offer of the company employing them to pay a part of the purchase price. This is probably the first instance of workmen buying an ambulance and maintaining it themselves, and it is an excellent illustration of their valuation of the service that can be accomplished with it.

TRADE ASSOCIATION FOR DETROIT.

It is expected that the embryonic plans of the Detroit, Mich., tire and motor car accessories dealers to form an organization will materialize within the next few weeks. At a preliminary meeting in the Detroit branch office of the Goodyear Tire & Rubber Company, about 75 dealers attended.

Miles & Foley, Seattle, Wash., and Harry Kettering, San Diego, Cal., both United States mail contractors, have purchased Kissel-Kar 1500-pound delivery wagons. Mr. Kettering will also use one truck for passenger service between San Diego and Julian, Cal.

The Tubular Concentrating Rod Company, New York, N. Y., has been incorporated with a capital stock of \$250,000 to manufacture and deal in machinery. J. McLaren, F. B. Knowlton and S. V. Dowling are the incorporators.

Two Moreland 2½-ton motor trucks are now being run between El Portal and Sentinel, in the Yosemite Valley, replacing the picturesque stages which have been seen so many years of service.

MEAT DISTRIBUTION AT ADELAIDE.

At Adelaide, South Australia, the metropolitan abattoirs slaughter practically all of the animals used for food in that city and the surrounding district, and the plant is controlled by a board. The meat is distributed to different points, some of it being sent considerable distances, and for this work 20 seven-ton trucks are used. The board has established its own garage and maintains the trucks, a foreman being responsible for the condition of the machines. Previous to using the trucks the meats were sent out by animal conveyance and railroad, a method which was more expensive and much less satisfactory so far as time was concerned. The service has several times been increased and there is reason to believe that it will continue to expand.

TO REMOVE MICHIGAN CURB PUMPS.

More than 100 gasoline stands, or stations, which have curb or sidewalk stands, have been ordered removed by the commissioner of public works of Detroit, Mich. His contention is based on a decision of the supreme court, which is in effect that the city had a right to remove all street obstructions. It is likely, however, that the dealers in gasoline will make a test case of the commissioner's order.

CAPITAL FOR ADAMS BROTHERS COMPANY.

On the promise of a well known manufacturer of trucks to invest \$10,000 and manage the business, citizens of Findlay, O., are endeavoring to sell \$25,000 worth of stock to rehabilitate the Adams Brothers Company, truck manufacturers, which floods and strikes a year ago forced into the hands of a receiver.

Employees of the Firestone Tire & Rubber Company, Akron, O., were given an outing by the company July 25 at Silver Lake park. Ten thousand people attended, employees and members of their families, and were given free tickets for everything, including transportation.

The Whitefield Motor Car Company, Inc., New York, N. Y., has been incorporated with a capital of \$175,000. Morgan J. O'Brien, Allan J. Corey and Dewnes Dilworth, all of New York City, are the incorporators.

The Star Rubber Company, Akron, O., will be reorganized to free it of a heavy indebtedness. A new organization will purchase and operate the present plant.

The Savage Tire Company, San Diego, Cal., has opened a new sales branch in San Francisco, which is to be the nearest on the Coast.

THE CASS MODEL E 3000-POUND TRUCK.

THE Independent Motors Company, Port Huron, Mich., a reorganization of the Cass Motor Truck Company, is building a 1½-ton truck, to be known as the Cass Model E. It is designed particularly for the medium duty field, and its makers claim for it unusual efficiency and the advantages of highly specialized construction.

The motor is of the Continental L head type and was especially designed for commercial vehicle service. The four cylinders are cast en bloc from a special grade of iron and have a bore of 3¾ inches and stroke of 5¼. The manufacturer's rating is 40 horsepower at 1500 revolutions a minute. Extreme care is taken in the grinding of the cylinders and the fitting of the rings.

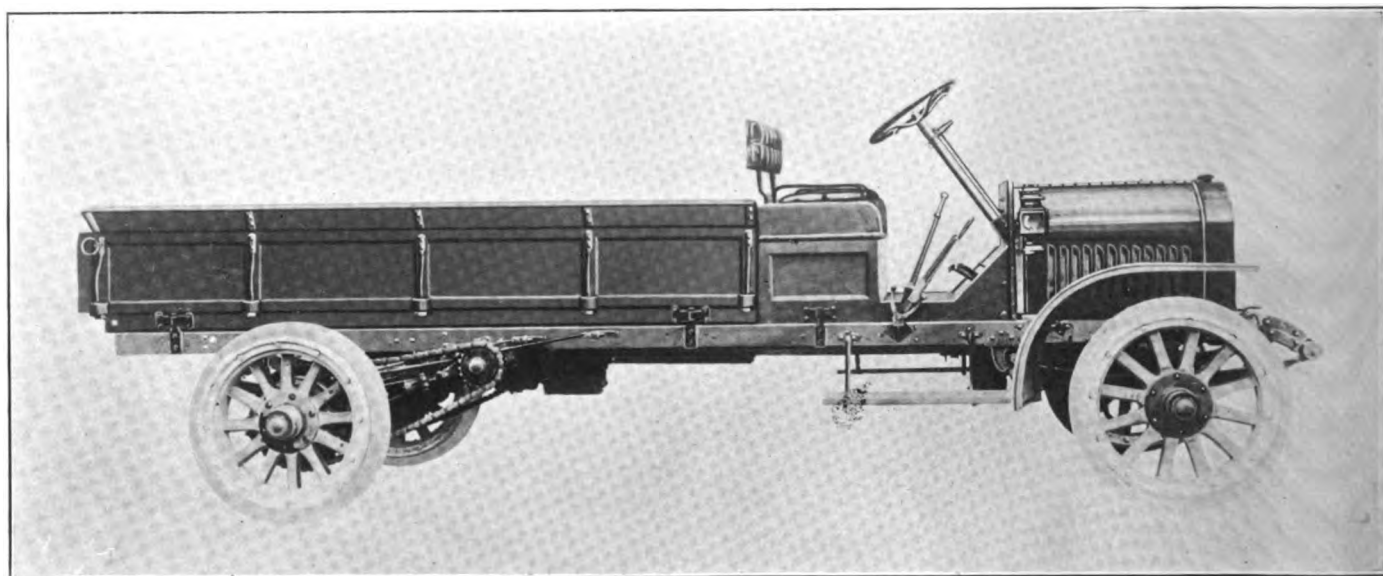
The water jackets are ample in size and the head is cast separately, a construction allowing better fin-

mechanism is fully protected against foreign elements and is easily accessible.

The carburetor is a Zephyr and the intake pipe is not only short, but has a diameter of 1½ inches. Vaporization of the fuel is assisted by the heat of the exhaust, and control of the mixture is conveniently placed upon the dash.

A single system of ignition is utilized, a Mea true high-tension, water proof magneto being fitted. It is mounted on the right hand side of the motor and is driven by the pump shaft.

Lubrication is by a force feed, constant level splash system. The oil is forced by a double vertical pump from the reservoir direct to the timing gears and over the main bearings. From these points the surplus lubricant drains back to the oil pan, where the proper level is maintained for the lubrication of the cylinder



Cass Model E Truck, Having a 144-Inch Wheelbase and Designed Particularly for the Medium Duty Field.

ish of the cylinder core, as well as insuring the removal of all fins, core sand, core wires or other material which would impede the circulation of the cooling fluid.

The crank case and oil reservoir are separate aluminum castings. Three main bearings are utilized, these being ample in size, of bronze lined with babbitt. They are supported in the upper half of the crank case and are accessible by displacing the oil reservoir. The crankshaft is of a special steel, drop forged and heat treated, and has a tensile strength of 90,000 pounds to the square inch. The single camshaft operating both the intake and exhaust valves is a drop forging from a single piece of low carbon steel, and the cams are integral. Accessibility is a feature of the construction and the camshaft may be displaced in a very short time by removing the gear case cover.

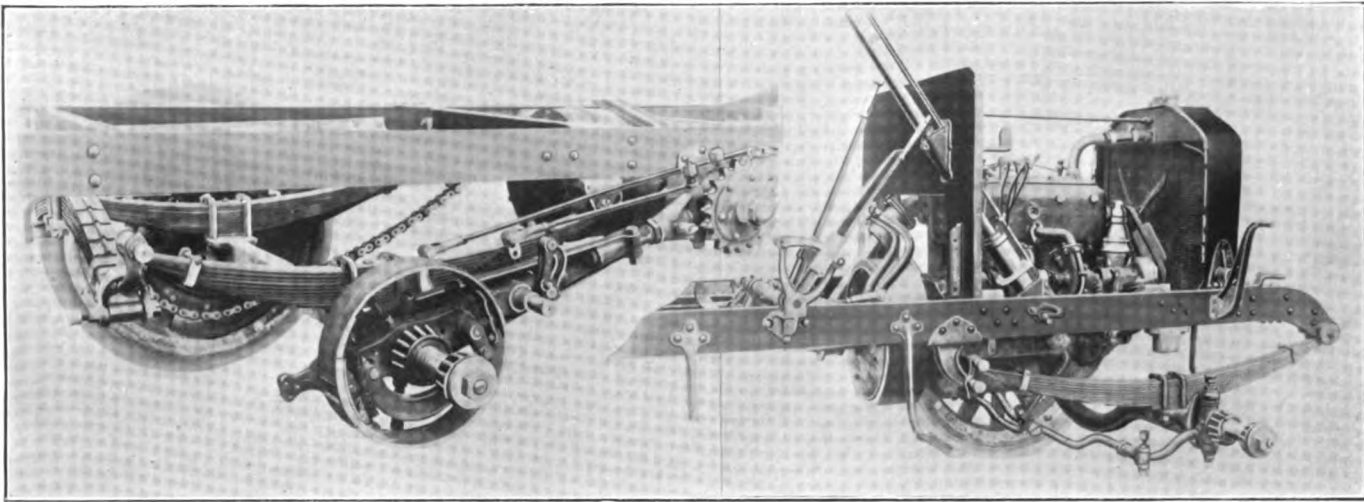
Both the intake and exhaust valves are interchangeable. They are of generous size and have nickel steel stems accurately ground to size. The valve

walls, pistons, connecting rods, camshaft bearings and the centre crankshaft bearing. An accessible gauge indicates the level of the supply in the crank case.

The cooling fluid is circulated by a pump located on the right hand side of the motor, and the drive is through a coupling from the shaft actuating the fan pulley. The radiator is of the cellular type, flexibly mounted on a trunnion moving in two directions to compensate for any distortion of the frame. The capacity of the cooler is sufficient to insure a proper operating temperature under the most severe conditions of service.

The clutch is a cone of pressed steel faced with leather, is 15¾ inches in diameter and has a face of 2⅝ inches. A brake or stop is fitted, which prevents spinning of the clutch shaft after disengagement of the clutch and makes easy the changing of speeds.

The drive is by shaft to the gear set, double universal joints being utilized, although the drive is practically a straight line. Final drive is by chains, run-



Showing the Rear Axle of the Cass Model E Truck, Power Plant and Spring Construction.

ning on hardened steel sprockets of $1\frac{1}{4}$ -inch pitch and $\frac{3}{4}$ -inch diameter.

The gear set is a Brown-Lipe of the selective sliding type, providing the conventional three forward speeds and a reverse, a unit with the jackshaft. The jackshaft is a Sheldon, and the differential and driving shafts are mounted on annular ball bearings. The differential housing has an ample sized cover, providing easy access to the gears.

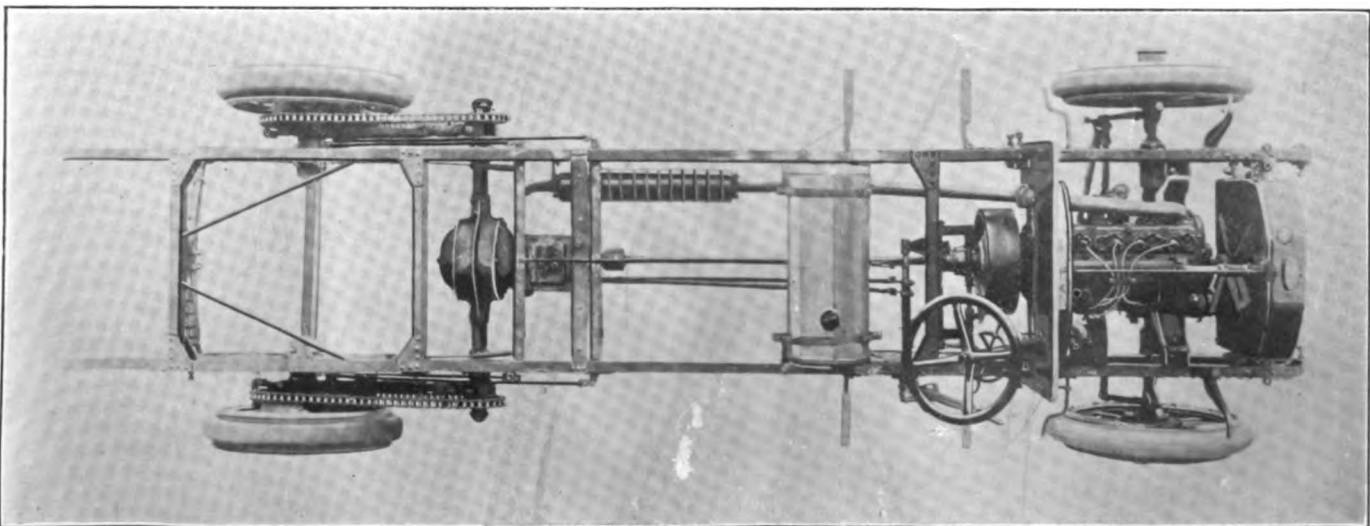
Sheldon axles are utilized both front and rear. The front member is a one-piece drop forged I beam section type with the spring pads forged integrally, and is double heat treated after leaving the forge hammers. The steering knuckles and levers are drop forgings of chrome nickel steel, double heat treated. The spindles are $1\frac{31}{32}$ inches in diameter and are fitted with standard adjustable taper roller bearings. The rear axle is a one-piece drop forged rectangular section, $1\frac{3}{4}$ by $2\frac{3}{4}$ inches, with $2\frac{1}{8}$ -inch diameter spindles. It is double heat treated and is fitted with adjustable taper roller bearings.

The brakes are Sheldon, of the internal expanding and external contracting type, and both the service and the emergency are located on the rear wheels, conforming to the United States standard for army trucks.

Brake drums are 14-inch diameter, $2\frac{1}{2}$ -inch face.

The frame is a four-inch rolled steel channel section, hot riveted and strengthened by gusset plates and angles at the corners. The height from the ground is $28\frac{1}{2}$ inches with a two-ton load and the road clearance is $10\frac{1}{2}$ inches. The springs are semi-elliptic in front, 47 inches long by $2\frac{1}{2}$ wide. The platform spring is ribbed, 36 inches long by $2\frac{1}{4}$ wide, and the side springs are 40 inches long by $2\frac{1}{4}$ wide. The minimum wheelbase is 122 inches, maximum 144. The wheels are of the heavy artillery type with 12 two-inch rectangular spokes. Solid demountable tires are employed, 36 by $3\frac{1}{2}$ inches in front and 36 by four at the rear. The driver's location is at the right.

The spark and throttle controls are mounted on the steering column and the usual accelerator is provided. A governor of the centrifugal type, and which can be adjusted to any desired speed, prevents overspeeding of the machine, as well as racing the motor. The fuel tank is mounted on the frame under the driver's seat and has a capacity of 18 gallons. The weight of the chassis is 4000 pounds and the body is optional and extra. The loading space back of the driver's seat is 96 inches minimum and 120 inches maximum. Three oil lamps, horn and kit of tools come with each chassis.



Chassis Plan of the Cass $1\frac{1}{2}$ -Ton Truck Which Follows Conventional Practice in Many Details.

WILL MAKE POPE-HARTFORD PARTS.

An announcement of importance to the thousands of users of Pope-Hartford trucks is to the effect that the manufacture of parts for this machine is to be continued. The Pope-Hartford Company of Connecticut has been organized and taken over the tools, patterns and everything pertaining to the business from the receiver of the defunct firm. The president of the new concern is Wilbur C. Walker, who has been connected with the manufacture of the Pope machines for many years, and with him are associated many men familiar with the manufacture, sale and use of Pope motor cars.

The same incorporators have formed the Hartford Motor Car Company, to buy, sell and deal in motor vehicles. The firm is the Dodge representative in the vicinity of Hartford.

THERMOID RUBBER COMPANY'S WAR MAP.

A very timely publication is a fine set of maps which has been sent out with the compliments of the Thermoid Rubber Company of Trenton, N. J. Its numerous pages, which are large enough to allow space for a comprehensive and detailed sketch, contain representations of all the continents, shown with their geographical relation to each other, and a map of the warring nations of Europe, both grouped, and separately. Accompanying each is an index, which assists in finding any desired point on the map. Finely printed in colors, with the many small details showing clearly, this group of maps should be a valuable aid in following the course of the war.

PRUSSIA FAVORS THREE-TON TRUCK.

The Prussian government has extended its subsidy plan so that it will include a 30-horsepower three-ton truck for army use. Heretofore the Prussian army administration has favored motor trucks having a capacity for carrying a pay load of five to six tons, and only trucks of this size were subsidized.

The Motor Truck Club of America is to have a legal aid bureau. Copies of laws will be distributed to members, and representatives of the bureau will appear in court for traffic offenders, and the bureau will serve as legal adviser for the club members.

Referee E. G. Adams has confirmed the sale of the bankrupt Federal Storage Battery Company, Belleville, N. J., for \$5287. The property, consisting of motors, machinery, factory supplies, etc., was sold in separate lots.

A price war between the Standard Oil Company and the Indian Refining Company at Goshen, Ind., has resulted in a drop from 18 cents to nine cents a gallon in the price of gasoline.

NEW BULL THREE-WHEEL TRACTOR.

The Bull Tractor Company, Minneapolis, Minn., is placing a three-wheel tractor on the market designed to replace horses in doing farm work. The tractor will pull two 14-inch stubble plows 50 per cent. faster than horses and the motor will develop 12 horsepower at the pulley for stationary work. The machine has one wheel in front and two wheels, each five feet in diameter, at the rear. The motor has two horizontal opposed cylinders with bore of $4\frac{3}{4}$ inches and stroke of $6\frac{1}{2}$ inches. The normal speed is from 750 to 800 revolutions per minute. The outer end of the shaft carries a 10-inch pulley with $6\frac{1}{2}$ -inch face for a belt when used for driving stationary machinery.

MOTOR TRUCKS AT BOMBAY.

The increasing number of motor trucks in use in Bombay, India, has impelled the government to make regulations relative to operation of machines upon the public docks of that port, and varying prohibitions have been removed so that there is reason to believe that the mercantile interests of the city will utilize trucks to a greater extent than ever before. The dangers of fire have been the principal causes for concern, and yet speed is limited to 10 miles an hour and vehicles must not be left unattended. One rather amusing requirement is that electrical ignition only can be used, which would appear to imply that there were machines of extreme antiquity in service in Bombay.

MAY BUILD PACIFIC COAST PLANT.

The International Motor Company is considering plans for the establishment of a branch factory in Los Angeles, Cal., for the construction of Mack and Saurer trucks, the purpose being to lessen the ultimate cost of these machines on the Pacific Coast by the elimination of transportation charges, and to afford better service to the users. The proposed plant would employ about 300 men.

The federal government has taken up the question of glaring automobile headlights and a method for regulation is being worked out. When completed a patent is to be taken out and it has been suggested that it be dedicated to the people.

At the annual stockholders' meeting of the Lauth-Juergens Motor Car Company, Fremont, O., J. W. Worst, A. E. Culbert, H. H. Weinhardt, J. W. Forsythe, W. A. Lucas, Theodore Juergens and L. C. Worst were elected directors.

R. P. Dowse has joined the forces of the Kelly-Springfield Tire Company of Akron, O. He was formerly general sales representative for the Goodyear Tire & Rubber Company of Detroit.

THE BROWN HOIST JIB TRUCK CRANE.

HANDLING heavy loads at places of delivery, where no facilities exist for unloading, necessarily means loss of time, and with rare exceptions machines are not so equipped that freights can be discharged expeditiously without reference to conditions. The concern that has its own transportation department admirably organized, with every requirement for economy of time and labor, may have material loss simply from the fact that conditions where delivery may be regularly or occasionally made, necessitate not only hand handlings, but delays from congestion, traffic, etc.

The economy that is practical through truck construction or equipment is largely what the owner makes possible through careful study and foresight, but no saving of time or labor can be made if the conditions for use are such that special provisions to economize cannot be relied upon. Where haulage is from a specific location, such as a mill, shop, factory, warehouse, yard, pier or terminal, to another, loading may be done by elevated platforms, cranes, derricks, skids, by gravity, by loading machines, etc., but when delivery is made facilities seldom exist where the loads may be removed with rapidity equal to the loading.

Haulage of some commodities, however, is where the conditions are reversed, and the loading requires much more time than unloading, and the trucks are equipped so that there will be the least delay possible. This statement applies to machines with dumping bodies that are elevated by manual or mechanical power. Quick discharging bodies have been used for many years, but until utilized as motor truck equipment they were elevated and lowered by hand.

But loading or unloading heavy freight, or perhaps both works, where special handling facilities have not been provided, has necessitated entirely different equipment. The Brown Hoisting Machinery Company, Cleveland, O., has developed a pillar jib crane with capacity of one ton that can be installed on chassis of such sizes as will carry heavy loads, and is operated by the truck motor.

The crane pillar is installed in the centre of the chassis directly behind the driver's seat, and the hoisting and lowering of the load is done through clutches, gears and chain connections. The crane is constructed of structural steel shapes and rotates on a steel pillar casting bolted to the chassis frame, being mounted on thrust roller bearings. The hoisting shaft stands vertical, running from the top of the crane through the steel pillar

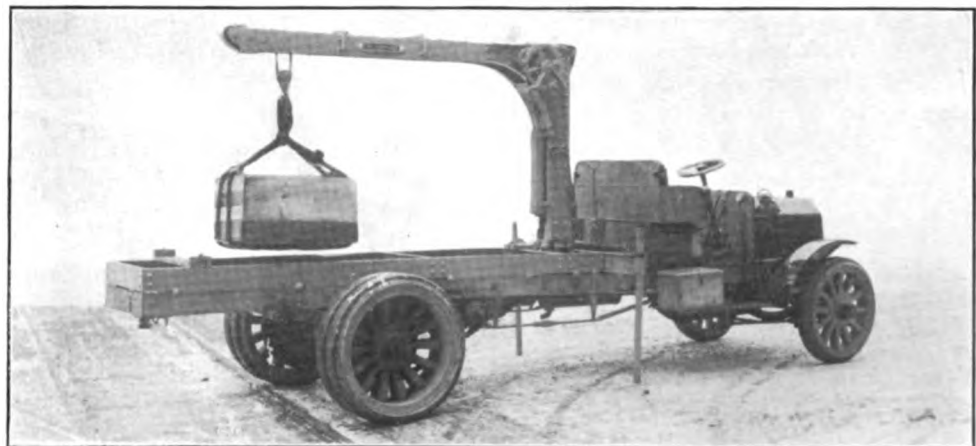
down to the centre of the chassis, where it is connected to the main hoisting shaft, which is in turn connected either to the transmission shaft or a countershaft.

The connection is made through roller chains and sprockets. There is an intermediate idler shaft to afford the necessary reduction of hoisting speed. A single-jaw clutch is fitted to the transmission shaft or countershaft, and through this the crane is operated. The main hoisting shaft is provided with a double-jaw clutch that is operated by lifting or lowering the lever that is seen just behind the driver's seat in the illustration. This clutch throws either one or two bevel gears in mesh with the gear attached to the vertical hoisting shaft for hoisting or lowering the load.

At the top of the vertical hoisting shaft is a bevel gear that meshes with a pinion secured to a horizontal shaft which carries a chain sprocket. A hoisting chain passes from this sprocket and extends along the jib to the trolley and from the trolley wheels over the sheave in the bottom block, and is dead-ended by a pin in the end of the jib. The dead end at the hoist sprocket falls into an open box attached to the crane mast.

To operate the crane for hoisting the driver engages the clutch on the transmission shaft or countershaft, and then raises the hoist operating lever to the hoisting notch, which engages the crane clutches and the load may be lifted. For lowering the operating lever is pushed downward to a notch where the crane mechanism is reversed and freight may be dropped. But there is a safety device that necessitates connecting the engine before the load can be lowered.

The crane jib is constructed of two channels, with flanges turned in, and the crane trolley is mounted on four wheels that are movable on the lower flanges of these channels. The trolley is moved in or out by a hand chain and sprocket that is seen in the illustration. The crane and its load is moved from side to side by hand. To carry a heavy weight without excessive side stress upon the chassis construction, the chassis is fit-



The Brown Hoist Pillar Jib Crane Having Lifting Capacity of One Ton, Installed on a Five-Ton Peerless Fitted with Supporting Outriggers.

ted with outriggers at either side in line with the base of the crane pillar, and wrought iron pipe supports that are adjustable by pins to inequalities of the surface on which the truck stands, can be placed so that the full capacity of the crane can be swung off the side at the end of the jib with perfect security. As a protection against overloading the chassis frame can be reinforced by a structural frame of wood or metal carried above the regular construction, either flush with the metal or on bolsters.

The Peerless truck that is shown in the illustration is in the service of the Pullman Company at Chicago, Ill., and as will be noted the chassis is fitted with outriggers and the supports are in position so that the full capacity of the crane can be swung outward to the length of the crane jib. The crane can also be made and installed so that it may be operated by hand, when such equipment is desired, and either the manual or power types can be fitted to all makes of trucks within the capacities of the chassis.

TRACTION COMPANY TO USE 'BUSES.

The Cleveland, O., Railways Company, which operates the trolley lines in that city and suburbs, has been given authority by the city council to operate motor omnibuses in different sections that are not now served by the regular electric car lines. The company purposes to begin experimentally, and if the patronage is sufficient to justify, it will increase the number of machines. The desire is to afford needed transportation facilities without the construction of tracks and the purchase of additional equipment.

TO MARKET NEW TRUCK.

The West Coast Wagon Company of Tacoma, Wash., which has manufactured wagons for 14 years, is preparing to place on the market a 1½-ton internal gear driven motor truck to sell for about \$1900. Featured in this new product will be a combination chassis and bed, which permits a very low body through dispensing with the frame. The truck will be fitted with Continental motors.

H. C. Whitney, formerly agent for Alco machines in New Orleans, La., has been appointed general sales agent of the Garford Philadelphia Company, which handles the Garford trucks and the Willys-Overland pleasure and commercial cars in Philadelphia, Penn.

The firm of Miles & Foley, Seattle, Was., which delivers all the heavy government mail in that city, has begun the use of several 1500-pound motor trucks in this service.

The Willard Storage Battery Company, Cleveland, O., will soon begin construction work on a new \$3,000 plant. The building will be 200x135 feet.

UTILITY OF MOTOR TRACTORS.

Motor tractors are designed to have large haulage capacity at comparatively slow speed, and the load that can be transported is dependent upon numerous conditions, but the knowledge of the engineering fraternity and the industry is exceedingly limited, and seemingly a very good purpose would be accomplished were there possibilities for thorough demonstration of machines in differing works. Thus far tractors have been used by a few concerns with varying success. Some have attained large economies, while others have failed to obtain equal measure because of the character of the work engaged in.

A very substantial impetus has been given to tractor building and service in France by the organization of practical trials by the minister of war, the benefits being primarily obtained by the government, but the promotion has undoubtedly been beneficial to the builders and the people as a whole. Undoubtedly tractors could be used in considerable numbers by the United States War Department, but such machines have not been considered. Until tractors are exploited and developed to standards of capacity, speed and other important detail, but comparatively little progress will be made with them, at least as a commercial proposition.

BRITISH IMPORTS AND EXPORTS.

While Great Britain continues to increase its purchases of automobiles and parts abroad, her exports to foreign countries are slightly declining. For the first six months of the current year England's imports of motor cars, chassis, parts and tires was \$22,224,118, as against \$17,442,214 for the corresponding period of the previous year. English exports of these same commodities for this same period decreased from \$10,329,436 in 1913 to \$9,771,616 this year.

Frank J. Girard, formerly in charge of the Peerless Motor Car Company's branch, Columbus, O., has been appointed a district manager of the headquarters in Columbus. Central and southern Ohio will be the territory covered.

E. A. Travis, formerly manager of the Boston branch of the Locomobile Company, has been made assistant sales manager at the factory at Bridgeport, Conn. A. P. Hawes succeeds Mr. Travis in Boston.

The Norma Company, New York, N. Y., has sent out a letter to the importers of ball bearings suggesting that they co-operate in supplying each other with bearings during the European war period.

The Marathon Tire & Rubber Company, Akron, has increased its capitalization from \$100,000 to \$200,000.

TWO-TON AETNA TRUCKS.

New Detroit Concern Producing Machines Assembled from Standard Parts.

The Aetna Motor Truck Company, a concern recently organized at Detroit, Mich., to build machines from standard parts, has placed its first productions in the market and plans to increase its manufacturing as the selling demands justify. The company makes the statement that its policy is to produce a type of vehicle that will be of a size to afford a convenient transportation unit of sufficient capacity to serve the requirements of a large number of business enterprises, and the construction will be of what are known to be high-grade components, built by standard manufacturers of the industry.

The manner of building is claimed to insure minimum manufacturing cost, while the use of productions of concerns specializing the different units of the machines means not only dependable vehicles, but constant sources of service from the manufacturers during the life of the trucks without reference to the stability of the Aetna Company. Aside from the sheet metal parts all of the components of the machines are purchased by contract, and the assembling is done at the Detroit plant.

The motor is a Hazard construction of four-cylinder, four-cycle, water-cooled type, with cylinder bore of four inches and stroke of $4\frac{1}{2}$ inches, and is rated by the maker at 25-30 horsepower. The engine is designed for heavy service, having a crankshaft mounted on three main bearings $2\frac{1}{2}$ inches diameter. The camshaft is carried on three bearings. The timing gears are spiral cut and these drive the water pump and the magneto. The lubrication is a combination of mechanical feed and splash. The cooling is by a forced circulation of water through a radiator, which is cooled by a fan. The ignition is by an Eisemann magneto with automatic spark advance and the fuel is carburetted by an automatic float feed type of carburetor. The motor is governed to give a vehicle speed of 15 miles an hour.

The clutch is a Brown-Lipe multiple-disc construction that is built with 24 plates faced with Raybestos. The transmission gearset is a selective Brown-Lipe design that affords three speed ratios forward and reverse, having gears with one-inch face, and from this the power is transmitted through a propeller shaft to a worm shaft and gear wheel of the David Brown type incorporated in the rear axle, which is a Sheldon production. The worm shaft is mounted above the wheel. The reduction is 8.6:1. The worm shaft and the gear wheel are mounted on Rhineland ball bearings. The driving shafts are $2\frac{3}{4}$ inches diameter and are much heavier than are usually used in machines of two-ton capacity.

The frame is built of pressed steel channels $\frac{1}{2}$ inches width and four inches depth, 3-16 "

material, strongly reinforced, and this is suspended on semi-elliptic forward springs, 40 inches length and $2\frac{1}{2}$ inches width. The rear springs are an innovation in truck construction, being three-quarter elliptic, 54 inches length and three inches width, with 11 leaves of $\frac{3}{8}$ -inch steel. These springs are underslung, and the statement is made that they have been carefully experimented by the manufacturer, as well as the company, and have been found to have surprisingly satisfactory qualities. There will undoubtedly be a great deal of interest in the result of this suspension, which is regarded by many as an experiment.

The forward axle is an I section. The wheels are artillery type, 36 inches diameter, and are made with 14 two-inch spokes. The wheels are fitted with 36 by four-inch tires forward and 36 by $3\frac{1}{2}$ dual tires rear. The wheelbase is 144 inches standard, but a 130-inch chassis is built when ordered. The tread is $56\frac{1}{4}$ inches forward and $59\frac{1}{4}$ inches rear.

The truck is built to be driven from the left side by Ross steering gear of the worm and nut type, this having heavy linkage. The gear ratio changing lever and the emergency brake lever are at the centre of the footboard. The clutch and service brake are operated by foot pedals. The service and emergency brakes are actuated in and on large drums on the rear wheels. The loading space of the standard chassis is 156 inches length and 72 inches width, and the shorter chassis loading space is 132 by 72 inches. The chassis is equipped with electric dash and tail lamps supplied with current from a storage battery carried on the left running board.

The Aetna Motor Truck Company has a factory at Richmond avenue and Grand boulevard at Detroit, and the capital is \$150,000. The executives of the company are: J. George Wagner, president; Ernst E. Kinney, vice president; William A. Aldred, secretary; J. J. Wilson, treasurer. These officers, with George Humbert, constitute the board of directors.

The Kalamazoo Motor Truck Company, Kalamazoo, Mich., will manufacture a trailer to be used in service with its motor trucks. By means of a patented steering device, which connects the drawbar directly with the steering gear, the trailer is guided in the track traversed by the truck.

A report by the district committee of the House of Representatives, Washington, D. C., is favorable to the plan of levying a special tax on motor cars in the District of Columbia. This tax will range from \$5 to \$10 annum, depending on the horsepower of the car.

For the first six months of 1914 a total of 44,500 motor cars were shipped out of Detroit, the number of cars being estimated at 189,125, which is 67 per cent. of the total shipped out of Detroit for a year of 1913.

IDEAL TRUCKS BUILT IN THREE SIZES.

BUILDING two types and three sizes of machines that are adapted for rapid haulage of light and moderate loads, the Ideal Auto Company, Fort Wayne, Ind., has sought to meet every demand that may be made for vehicles of these classes. The company has been established for a considerable length of time and has the factory facilities and equipment for manufacturing wagons and trucks of high grade. The engineering force is well organized, being composed of men of ample experience, and endeavor has been made to produce machines that will have every quality of endurance, as well as being economical of labor and general operating expense.

The company's policy has been to build vehicles that conform to well established principles, there being no innovations or experiments. The engineers have developed types that are extremely simplified and every component has been made as accessible as possible, that there will be need of minimum attention to insure thorough maintenance.

The chassis are built from carefully selected units that are produced by manufacturers recognized as specialists of the industry, and have been developed from constant laboratory tests as well as from experience covering considerable periods, so that these have been adopted with what may be regarded as precise knowledge of efficiency and endurance. These units have been assembled with a view of securing a thoroughly harmonious construction that will be as light and strong as is possible, and yet have maximum endurance insured by the use of highest quality metals and formations.

Built in Three Models.

The machines are built as three models, M, L and R, and of these model M has capacity of 2000 pounds and is chain driven; model L has capacity of 3000 pounds and is either chain or worm gear driven, and model R is rated from 4000 to 5000 pounds load capacity and is worm gear driven. This affords the purchaser of the 3000-pound vehicle a choice of the means of power transmission. The three models are intended

to meet with practically every requirement of business men who have their own transportation equipment, and will provide units that are demanded by a very large majority of those who have haulage to do.

The principal difference between model M and the chain driven model L is in the proportions of parts and chassis dimensions, and the same distinction can be made between the worm gear driven model L and model R. For the purpose of description model L has been chosen, and variance from either type will be stated where desirable. The same power plant is used in all four types.

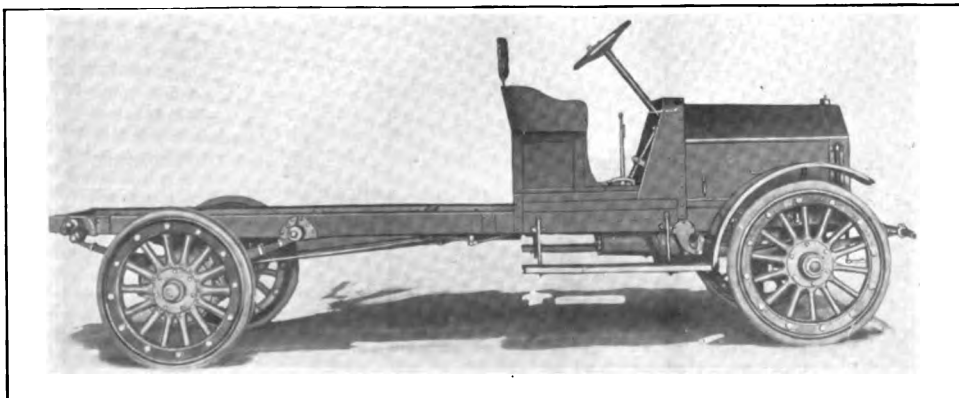
Use a Continental Motor.

The motor is a Continental construction with the engine, clutch and transmission gearset included in a single unit, the motor cylinder being cast en bloc with water jackets integral. The engine is a vertical, four-cylinder, water-cooled, L head type, with cylinder bore of $4\frac{1}{8}$ inches and stroke of $5\frac{1}{4}$ inches, that is rated at $27\frac{1}{4}$ horsepower by the S. A. E. formula, and which the manufacturer claims will develop 42 horsepower at 1500 revolutions.

The cylinder block and the water jacket head are cast separately, this insuring uniformity of the water chambers and a certainty of unobstructed circulation. The crank case is a nickel aluminum alloy of two sections, the upper carrying the three main bearings and the lower forming the oil reservoir. The crankshaft is $1\frac{3}{4}$ inches diameter with the front, centre and rear bearings $2\frac{3}{4}$, 3 and 4 inches length respectively, and it is flanged to prevent end thrust. The crankshaft is a high-grade carbon steel that is heat treated so as to have a tensile strength of 90,000 pounds to the square inch. The camshaft is drop forged, with the cams integral, and is so installed that it can be withdrawn by removing the timing gear case cover.

The pistons are fitted with four rings and five oil grooves to insure perfect compression and lubrication, and the wristpins of steel tube are clamped in the connecting rods and oscillate in bosses in the piston walls. The connecting rods are I section drop forgings and the caps are retained by nickel steel bolts. All reciprocating parts are carefully balanced.

The crankshaft, camshaft and connecting rod bearings are nickel babbitt, the crankshaft and camshaft bearings being retained by brass screws, and the connecting rod bearings are made adjustable by the use of steel shims. The valves have nickel steel heads, welded to carbon steel stems, the ends being hardened. The valve tappets are a mushroom



Chassis of the Model L Ideal Truck, Which Has a Rated Load Capacity of 3000 Pounds—This Type Is Worm and Gear Wheel Driven, but Chain Drive Is an Option.

construction, of nickel steel, with adjusting screws and nuts. Both the valves and the tappets operate in removable bushings. The timing gears are helically cut and are practically noiseless.

Other Details of the Motor.

The cooling is by water circulated by a double-bearing centrifugal pump through the large inlet and outlet manifolds and a vertical tube radiator. Radiation is promoted by a fan mounted on ball bearings and carried on an adjustable bracket driven by a flat belt from a pulley on the water pump and magneto shaft. The engine is lubricated by plunger pumps actuated by an eccentric on the camshaft, by which oil is drawn from the reservoir through a filter and forced by a system of piping over the timing gears and the rear main bearing, and the excess flows to the base of the crank case, where it is distributed by splash to the main, camshaft, connecting rod, wristpin bearings, the valve tappets and the cylinder and piston walls. The overflow from the oil pool is drained into the reservoir. The fuel is carburetted by an automatic float feed carburetor and the ignition is a Bosch dual system.

The clutch is a multiple dry disc type that consists of 13 steel plates faced with Raybestos, which is operated by a triple spring assembly. The rocker shaft that operates the clutch is carried through the bell housing for the connection with the operating pedals. The transmission gearset is a three forward ratio and reverse type of selective construction, the main and countershafts and gears being made of nickel steel, especially designed for noiseless operation, and the shafts are mounted on Timken roller bearings. The power plant is supported by two arms at either side.

Features of the Worm Drive Types.

Up to this point all machines are identical. From the transmission gearset the drive is by shaft. Taking the model L worm gear driven as an example, the driving shaft is in two sections, these being coupled with universal joints. The rear end of the forward section is carried on a self-aligning ball bearing mounted on a frame cross member. The rear axle is a semi-floating construction with a pressed steel housing with the bevel gear differential assembled with the gear wheel. The worm shaft is mounted on top of the housing in a plate that carries the bearings, this and the differential and axle shafts being fitted with Rhineland annular ball bearings. The worm and gear wheels are the David Brown type of construction.

The chassis frame is constructed of pressed steel channels, the side members being $5\frac{1}{2}$ inches width and $\frac{3}{16}$ stock, with heavy cross members, strongly gusseted. This is mounted on semi-elliptic springs, the forward set 42 inches length and $2\frac{1}{2}$ inches

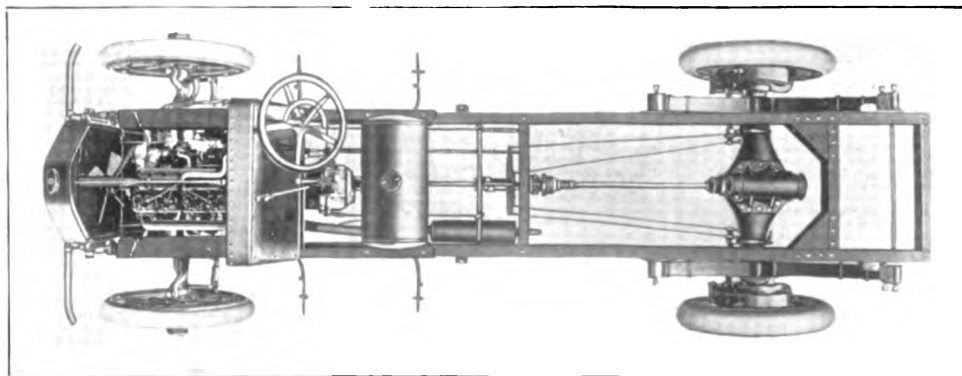
width, and the rear set 54 inches length and three inches width. These springs are shackled at the rear ends only, the driving thrust of the traction wheels being taken by heavy brackets on the chassis frame on which the spring eyes are pivoted. This is a construction much favored in European practise, but has only recently been adopted by a few American manufacturers. This obviates radius rods. The forward axle is an I section. The wheels are 36 inches diameter and are fitted with four-inch single tires forward and five-inch single tires rear. The wheelbase is 143 inches and the tread is 58 inches.

The steering gear is a Ross irreversible type and the drive is right side, with ignition and fuel supply levers mounted on the hand wheel, with the gear shifting and the emergency brake levers located at the centre. The clutch and service brake pedals are conventional in location. The service and the emergency brake are external contracting and internal expanding on brake drums 16 inches diameter and three inches face on the rear wheels.

The Chain Driven Model L.

The chain driven model L machine has a main shaft with two universal joints between the gearset and the jackshaft, which is a full floating type that is carried on heavy hangers having spherical bearings to compensate for chassis distortion, these hangers carrying the forward ends of the radius rods. The frame is carried on semi-elliptic springs, the forward set being 40 inches length and $2\frac{1}{2}$ inches width, and the rear set is a platform arrangement with side members 40 inches length and $2\frac{1}{2}$ inches width, and a cross member 33 inches length and $2\frac{1}{2}$ inches width. The forward ends of the side members are shackled. The rear axle is a rectangular section and the radius rods are constructed to have universal action at the jackshaft.

The control is practically the same, but the service brake is an external contracting type operating on drums 12 inches diameter and two inches face mounted on the jackshaft within the chassis frame, and the emergency brake is an internal expanding construction that operates within drums 14 inches diameter and three inches width on the rear wheels. The wheelbase is 144 inches. These chassis will take bodies of 10 feet six inches minimum length. The gasoline



Plan View of the Chassis of the Model L Ideal Truck, Showing the General Details of Construction and Design.

tank will hold 20 gallons, which is two more than that provided for the worm gear driven truck. The speed of both machines is 14 miles an hour.

Characteristics of Models R and M.

The model M differs only in that it has wheelbase of 124 inches, but the loading space is 10 feet eight inches maximum with the motor under the cab, or is eight feet 10 inches with the motor under the hood. The springs are the same in length and width, and while the service brake drums are on 12-inch drums two inches width on the jackshaft, the emergency brake operates in drums 12 inches diameter and 2½ inches width on the rear wheels. The chassis frame is steel channel five inches width. The 36-inch wheels are fitted with 3½-inch single tires forward and four-inch single tires rear. The drive is right side and when the machine has the motor under the hood the control levers are at the centre, but when under the cab the levers are at the right. The speed is 15 miles an hour.

The model R machine has wheelbase of 152 inches and tread of 62 inches, and the maximum speed is 12 miles an hour. The forward springs are 42 inches length and 2½ inches width, and the rear springs 54 inches length and three inches width. The 36-inch diameter wheels are fitted with four-inch single tires forward and four-inch dual tires rear. The service and emergency brakes operate on and in drums 16 inches diameter and three inches width on the rear wheels. The gasoline tank capacity is 18 gallons. The maximum body length is 150 inches. The chassis are delivered with standard driver's seats and the usual equipment of accessories and tools.

HARVESTER COMPANY TO DISSOLVE.

The International Harvester Company, Chicago, Ill., manufacturer of farming machinery and I. H. C. motor trucks, has been declared a monopoly in restraint of trade by the United States court and has been ordered to submit a plan of dissolution to the court within 90 days.

The Winona Oil Company, Winona, Wis., has purchased the plant, branch office and warehouse of the Valvoline Oil Company at Eau Claire, Wis., and will establish a tank wagon service between Eau Claire and Chippewa Falls, making the fourth branch plant established by the Winona company.

F. A. Barker has been elected vice president of the Anderson Rolled Gear Company, Cleveland, O. Mr. Barker was formerly prominent in the sales organization of the Willys-Overland Company.

Melcher Ekstroemer of the General Motor Company, Pontiac, Mich., has been appointed member of the sales force of that company's branch.

WHY GOODYEAR REVISED PRICES.

H. S. Quine, secretary to the president of the Goodyear Tire & Rubber Company, Akron, O., in explaining the action of that company in restoring the solid and pneumatic tire price list that had been recently changed by a 20 per cent. increase, says: "The United States produces no crude rubber. A large portion of the world's supply comes here via London and Antwerp. When war was declared, international commerce stopped. Means for transmitting payment to foreign markets were closed. Shipping ran to home ports, and it was thus impossible for America to buy rubber or have it shipped.

"This brought an immediate shortage of rubber in the United States, and prices of this raw material immediately jumped over 100 per cent. Having determined that a price advance was necessary, we announced it immediately, and without warning, to conserve resources and prevent dealers from overstocking on a speculation we knew would probably be only temporary. Also, if we permitted large dealers, with large financial resources to stock heavily, injustice would be visited on smaller dealers. So we advanced 20 per cent. and did it quickly.

"Since then we have worked steadily on the rubber problem. Exchange between New York and London reopened. We could transmit money. We could make shipping arrangements, and we did so. We now have plenty of money on hand, more coming and more promised, with every indication that there will not be another strain".

HANEY COMPANY ORGANIZED.

With capital of \$2,000,000, the Haney Rescue Apparatus Company has been incorporated at Tampa, Fla., to engage in the manufacture of fire and rescue apparatus. The officers are: President, E. H. Haney; first vice president, T. M. Weir; second vice president, F. M. Williams; treasurer, R. C. Stubbins; secretary and counsel, Samuel Borchardt, and an executive committee consisting of the president, treasurer, secretary and M. Binford.

The Dart Motor Truck Company, Waterloo, Ia., has been incorporated with a capital stock of \$600,000 to manufacture and sell motor trucks. C. W. Hellen and W. Galloway, both of Waterloo, and C. C. Wolf of Parkersburg, Ia., are the incorporators.

O. B. Henderson, formerly sales manager of the Ker Electric Vehicle Company, Cleveland, O., has been elected vice president of the Pacific Kissel Karach, with headquarters at Los Angeles, Cal.

A. Johnson has been promoted from assistant manager to manager of the Joseph Dixon Crucible Chicago branch.

TOURAINÉ TO MAKE SMALL TRUCK.

The Touraine Company, Philadelphia, Penn., maker of the Touraine six, will manufacture a commercial vehicle for light delivery purposes with a maximum capacity of 1000 pounds, to be known as the Vim delivery car. The model is a new one and is a special design for quick service.

Several types and sizes of bodies are built by the company as standard equipment. One is a pressed steel body of the fully enclosed type and when used the chassis is fitted with 30 by three-inch tires; a larger body of the same type is supplied on a chassis fitted with 30 by 3½-inch tires; a flare body, equipped with top and side curtains, is mounted on a chassis having 30 by 3½-inch tires. A wagonette body is also built as special equipment.

The motor is a Northway, a four-cylinder, L head, water-cooled type, cast en bloc, with bore of three inches and stroke of 4½ inches. The cooling is by thermo-syphon system, and the core work for the water jackets is so carried out that the cylinders are entirely surrounded by water. Lubrication is by positive force feed with splash, the oil reservoir holding 2½ gallons, which is sufficient for 600 miles. Ignition is by an Atwater Kent unispark, taking current from a set of dry cells. An automatic float feed exhaust jacketed carburetor is used.

Three speed changes are provided, the top ratio giving the machine a maximum speed of 30 miles per hour. The clutch is a cone, leather faced, 12 inches in diameter and 2½ inches wide. Wood wheels are furnished. The wheelbase is 93 inches and the tread is the 56 standard. The regular equipment includes a storm front, back and side curtains, oil lamps and tools.

The Philadelphia Commercial Museum offers facilities to American truck manufacturers who desire to obtain business in foreign countries in which they have no representatives. This museum is not a private company for gain, but is entirely supported by the city of Philadelphia.

The operation of any freight vehicle, weighing more than three tons, on Seventh avenue boulevard, between 38th and 46th streets, Rock Island, Ill., is prohibited by an ordinance, and violations may be penalized by any fine to \$200 for each offense.

A motor 'bus line will shortly be installed to operate between Almeria and Vera, Spain, a distance of 7 miles. Three 20-passenger 'buses, provided with freight and baggage compartments, are to be operated.

An addition, to cost about \$20,000, will be to the plant of the Walker-Weiss Axle Company, at Flint, Mich.

WATCHING THE FREIGHT BILLS.**Traffic System That Insures the Best Rates and Conditions.**

Advantages that result from an organization familiar with the whole question of traffic, rates, conditions and other phases of railroad transportation, are shown in the reports of the operation of the traffic department maintained by the Motor and Accessory Manufacturers. Any business, it appears, might profit by the same method of looking after its various problems affecting railroad rates and similar matters. The Motor and Accessory Manufacturers, which represents 262 leading makers of automobile parts and accessories, with capital of \$400,000,000 a few years ago determined to see what could be done to reduce the unnecessary drain on manufacturers due, it is stated, to unfamiliarity of many freight agents with rates to many places.

Though slow in getting started, this department soon compelled the interested attention of a large percentage of the membership of the organization, and now recovers in excess charges more than the cost of the service, besides providing the members with information relating to the subject generally. In 1913 about 60 per cent. more members used the department and just 50 per cent. more claims for rebate were filed. This shows the increased appreciation of the service provided.

The recovery of excess freight payments is, of course, the greatest factor through which the traffic department makes itself of value to the members of the organization. In this way one man recovered \$870 on claims of a few months and 33 members received an average refund of \$90, which is \$40 more than the annual membership fee. Another feature of the department's work is that of consultation affecting shippers' rights in traffic matters of any kind. Through expert familiarity of the men in charge, advice has been given which has resulted in the securing of the lowest transportation charge through proper packing and billing.

Inestimable benefit may be secured through the obtaining of a reclassification on certain articles of merchandise. Regarding this, 3500 bulletins, dealing with 52 subjects, have been issued in the last year. There is no limit to the number of freight bills members may send the auditors for verification of the charge by the published tariff. In the year ending June 30, 1914, 51,697 bills were audited, a large percentage of which were found to warrant claims for rebate for over-

nation of meetings of rate making committees. Information is furnished and the department is located there. Special interests affected by the rates considered are notified and can appear if they

MOTOR TRUCKS AS AEROPLANE CARRIERS.

European War Proves That Air Craft Are Helpless Without Aid of Powerful Motor Vehicles—Machines Afford Transportation and Repair Facilities.

ONE of the features of the present European war that stands out conspicuously is the use to which motor trucks have been put as a means of trans-

two at the bottom, and four sets of wires. After the seat has been removed, the work of half a minute, the next step is to remove the planes. This requires between six and seven minutes, as the numerous uprights and cross sections are interlaced with wire. This completes the stripping of the machine, as the body, motor propeller, etc., are packed as a whole. This is clearly shown in photograph No. 5, which also indicates how the machine is rolled into the truck.

The time required for the complete operation is 14 minutes. This includes time allowed for attaching the tractor to the truck. However, nine additional minutes, or 23 in all, are required to unpack and reassemble the aeroplane. This is made necessary, of course, by the fact that greater time must be given to the adjustment of each part in order to make it as secure as possible for flying.

Following this outfit is a motor truck work shop, especially designed for military aviation purposes. This machine is capable of making any repairs or supplying extra parts to the army aeroplanes. As can be seen from the photographs printed herewith, a complete equipment is carried, and the truck has sufficient electric power for lathe, grindstone, forge, carpenter shop and blacksmith shop. Both sides of the machine are lowered when work is to be done, and these form a fair sized platform on either side of the truck, which adds greatly to the working space.



1—Method of Detaching Pilot Seat in the New Type H. Farman Biplane, the First Step in Dismantling.

porting aeroplanes. While the aeroplane has been furnishing the spectacular features, yet the motor truck has silently remained in the background, making possible the effective work of the airman.

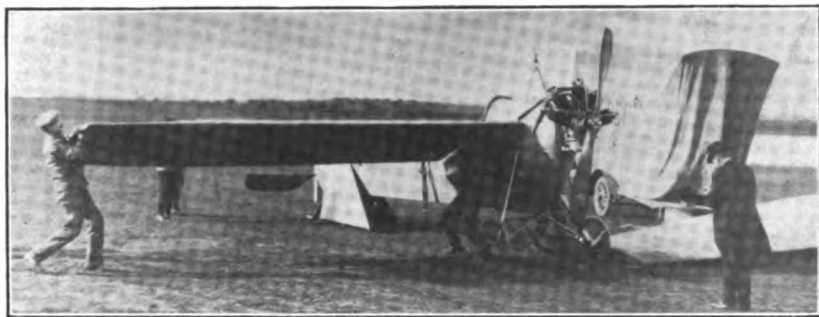
The allies, especially the French, have been making excellent use of the aeroplanes for scouting purposes. At Origny, Ham, Amiens, Chaulnes, Rethel and Grand Pre, forming the stretch from the Somme to the Meuse, where the allies are facing the Germans, all of the various companies are carrying the full equipment of aeroplanes, motor truck carriers and motor truck workshops.

The motor truck carriers are especially designed vehicles for the transportation of aeroplanes. These vehicles are without motive power, but they are attached to a tractor that has proved very efficient in hauling them through all sections of the country. The accompanying seven illustrations form a series that show the operation of dismantling an aeroplane from the time the pilot seat is detached until the plane has been packed and transported to its new camp.

As may be seen in photograph No. 1, the first thing to be removed is the pilot seat. On most models used by the French army this is connected to the body, or cellule, by four snap locks, two at the top and



2—Showing Seat Entirely Demounted from Body, Which Is Now Ready to Have Planes Removed.



3—Removing Second Plane from Machine; First Is Seen Lying on Ground.

It is the unanimous opinion of military experts abroad that the motor truck has been a dominant factor in war manoeuvres. In addition to the regular motor trucks that are making the long advances possible by virtue of the fact that the base of supplies can

This searchlight is a powerful instrument and during several night skirmishes that have taken place since the beginning of the war, has proved very efficient in locating the enemy.

Motor trucks equipped for destroying aeroplanes



5—Last of Packing; Total Time Required for Full Operation Was 14 Minutes—An Additional Nine Minutes, or 23 Minutes in All, Are Necessary for Re-Assembling Machine, as Greater Care Must Be Taken.



4—Placing Second Plane in Vehicle Designed to Carry Aeroplanes.



6—Attaching an Army Tractor to the Aeroplane Vehicle.

be moved 100 miles a day, instead of 24 miles a day, the limit with horses or mules, there is a great deal of special equipment that is rendering efficient service.

The N. A. G. motor trucks are being used by the German force with good results. A number of N. A. G. ambulances are doing strenuous work about Perone, St. Quentin, Guise and Rocroi, the German strongholds. These ambulances are of special design and give accommodation for six stretchers, a tier of three on either side of the truck. An aisle in the centre enables the Red Cross workers to perform whatever services are necessary.

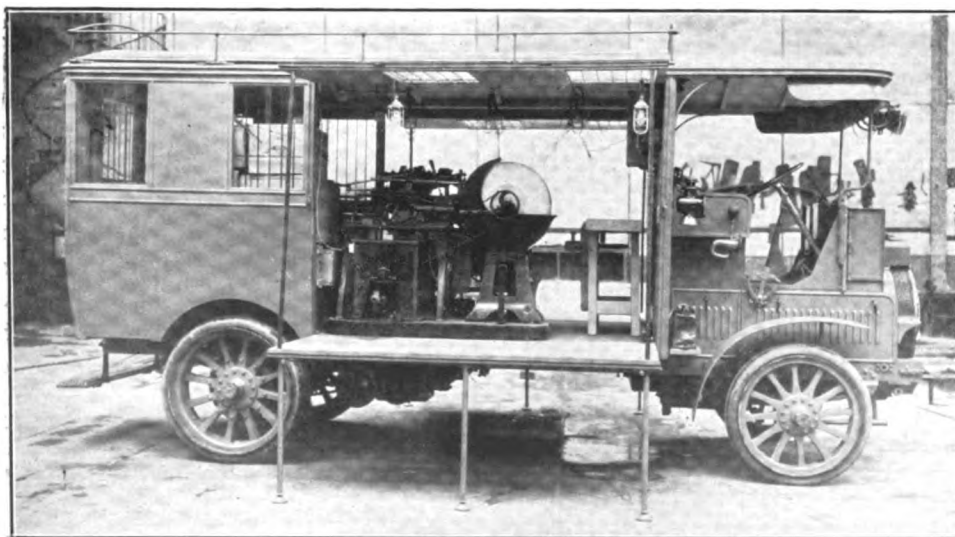
The Germans likewise are using a number of N. A. G. motor trucks that carry compressed gas cylinders for the inflation of their dirigibles. The Russians are using a number of Adler military field kitchen trail-

ers, which are proving a great boon to the various commissary departments.

and dirigibles, and motor truck hospitals are as common in the present war as cannons and soldiers. In analyzing the types of motor apparatus the various powers are using, it is to be noted that Germany is handling the heaviest type of vehicles in every respect. This is due, of course, to the fact that the Ger-



7—The Aviation Equipment Arriving at the New Station.



Showing Side of Motor Truck Workshop Open and Used as a Platform—Lathe, Grindstone, Forge and Electrical Equipment May Be Seen.

man subsidy of trucks for military purposes calls for the heaviest equipment. All countries today accept the statement that the army that has no mechanical transport will be most seriously handicapped. The advantages of the truck over the horse are many. The truck is easily supplied with fuel, oil and water, and cannot be stampeded. Neither is it subject to disease, and it is sanitary in every respect. The truck can be guarded by fewer men and in all manoeuvres can be more easily screened from the enemy.

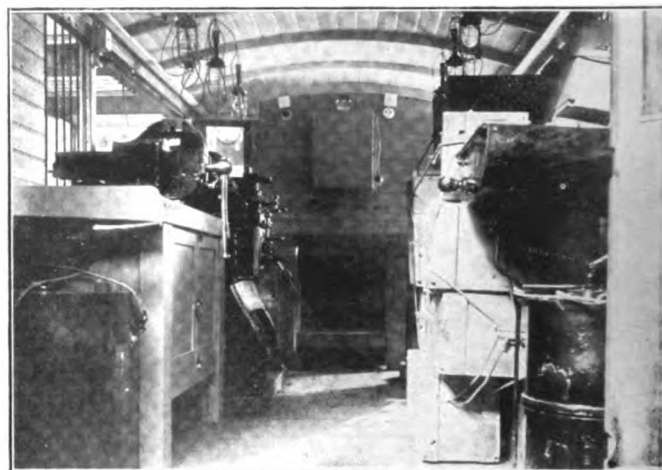
The present war has proved that the truck possesses many advantages in military operations. It has been noted that during attack every man is available. The men formerly required to guard the horses and mules to prevent a stampede, due to the noise of the cannons or the well laid plans of the enemy, now no longer needed, are sent to reinforce the fighting line.

Taking a division of 20,000 men, under the former system it required 662 four-mule escort wagons to carry five days' rations, grain and a small reserve of ammunition. It is considered that 12 miles is a good

average day's march for these wagons, giving 24 miles in two days. Consequently, the movement of the army is restricted to about 24 miles from the base of supplies. There are also some 299 wagons necessary for each division for use as ambulances, caissons for artillery, ammunition wagons, tool wagons and wagons for wireless telegraph outfits, etc. This gives a total of 961 wagons for each division, requiring about 4000 mules.

Contrast this with the situation presented by the use of motor trucks. The facility of movement of the armies using

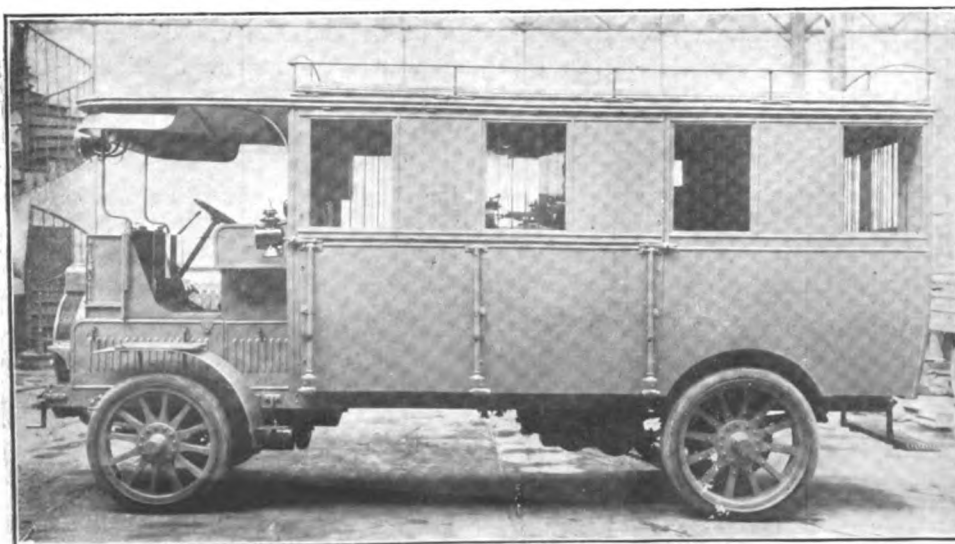
motor trucks is a revelation. These forces are not hampered in any way by supply wagons with their



Interior of Motor Truck Workshop, Showing Carpenter Bench and Boxes of Spare Parts for Aeroplanes, Motors, Etc.

limited capacity of travel. The truck used in warfare averages 10 miles an hour, which permits the armies to move daily as far as 100 miles from their base of supplies, where before the truck was adopted only 24 miles could be covered with any degree of safety. The truck has, therefore, increased the effective scope of an army's daily operations by more than 75 miles. This is proving the biggest factor in the present conflict.

While it is admitted by all powers that the army which has no mechanical transport will be most seriously handicapped, yet the question of securing a sufficient number of motor trucks and maintaining



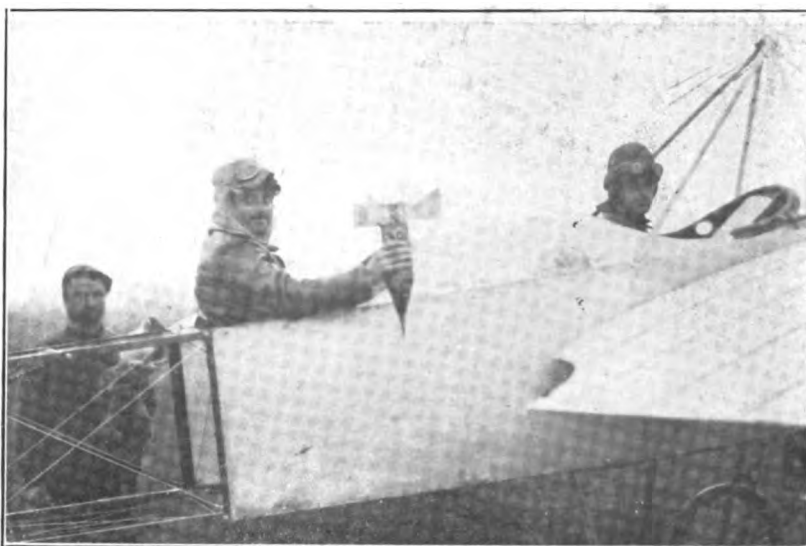
Motor Truck Workshop Especially Designed for Purchase by the Fre

itary Aviat Governme

Which Was Recently

these trucks during times of peace has been a problem that required considerable thought. There are two methods by which a government can secure its motor truck equipment in time of war; one is to maintain in times of peace the number of vehicles that will be required, and the other is to obtain them from civilian sources on the outbreak of war. The latter procedure may be by impressment or by means of an arrangement whereby certain owners are subsidized in times of peace for keeping suitable types of vehicles, with the understanding that such vehicles shall be placed at the disposal of the government at short notice on the outbreak of war.

Practically all the foreign powers, with the exception of Russia and Italy, use the second method. Because in peaceful times they are unable to find sufficient work for them, the subsidy plan is considered the cheapest way of meeting possible needs. Should a government de-



A French Military Aviator About to Start on Death-Dealing Trip—Especially Constructed Bomb Is Seen in His Right Hand.



A Company of French Military Aviators Lined Up in Front of the Army Ready for Special Scout Work.

lightest lorry used by any nation. This class of lorry is well suited to the type of roads found on the frontiers, and from practical use during the past few weeks it has proved conclusively its worth in the fighting sections. In France, where the number of vehicles used commercially is considerable, the subsidy is heavier than in England, but lighter than in Germany, because the manufacturing and the commercial conditions occupy the same relative position.

England has been subsidizing trucks since 1908. The vehicle that was required at the time was a light steam tractor and the subsidy was \$10 per year. However, today the subsidies are \$528 and \$576 respectively on $1\frac{1}{2}$ and three-ton trucks. Of the countries named, Great Britain lays down the greatest degree of standardization, and insists on the nearest resemblance between one maker's product and that of another, yet a certain amount of interchangeability as between one make and another

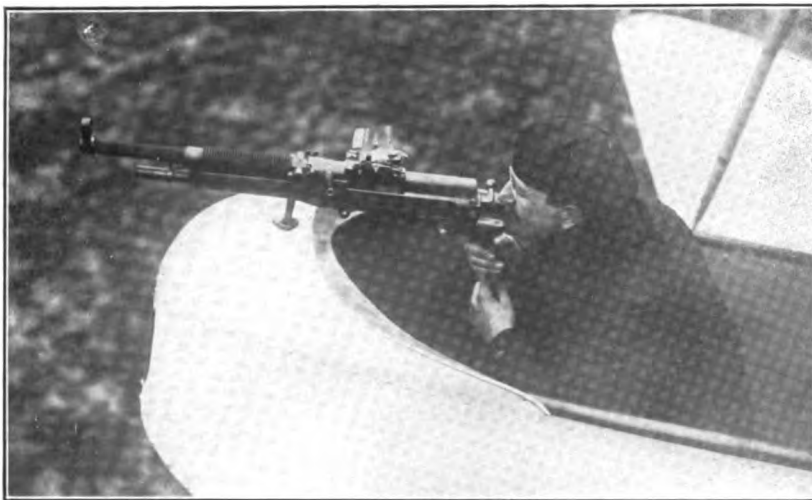
cide to support its own trucks in times of peace, they could be used for carrying of mails and in other departmental duties. In the United States, where there is such a broad field, the government could easily utilize all of the trucks needed for warfare in the postal service in times of peace.

Many foreign governments, however, favor the subsidy scheme and this is the recognized method of obtaining reinforcements in war time. This applies to men, horses and ships, as well as motor trucks. France, England, Germany and Austria have formulated subsidy systems on similar lines, and it is the application of these to the present conflict that has forced these nations to the extreme front in matters pertaining to motor trucks.

In working out its subsidy scheme, each country has been influenced, more or less, by the conditions in the country where they are liable to fight. France, with its national desire for speed, has adopted the



A French Military Dragoon Making a Reconnaissance Over the French—A Bomb Is Shown in the Foreground.



Rapid Firing Gun Mounted on a Farman Biplane—French Military Aviator Is Shown Sighting the Gun Several Hundred Feet Above the Ground.

is insisted upon by the government requirements.

The Germans, as stated, support the heaviest vehicles of all the nations now engaged in war. When the subsidy was first proposed in that country the number of vehicles operating there was almost negligible, and although there were one or two manufacturing firms in the country, these were building almost entirely for export. Consequently, the government had to create not only an industry to construct heavy vehicles, but also had to start the use of these vehicles on the roads. Hence the subsidy had to be heavy, and it is, in fact, the heaviest paid by any foreign country.

The Austrian type has certain restrictions, such as width of track and weight and a rather low speed, to enable the vehicles to operate in the mountainous district which forms the boundaries of the country for some distance. The Austrian government drew up its subsidy plan some time later than France or Germany, and the first Austrian trials were held in the latter part of 1911. As there are many roads throughout Austria where trucks could not be used to advantage in civil life, the subsidy, like the German sub-

vention, had to be fairly heavy.

Russia has no subsidy system, chiefly because the roads in that country are so few and those few so bad that it is considered inadvisable. There are very few manufacturers of motor trucks in Russia, and the country is compelled to buy what trucks it does use from foreign firms. As the result of the trials held during the past two years a great many orders have been placed for motor trucks by the government.

Italy, like Russia, has not adopted the subsidy plans, as few motor trucks could be used in civic service. However, the government owns a large number of light type lorries, and in the war with Tripoli these were used to advantage.

Summarizing, it is seen that roads, and the condition of these arteries of travel, play the biggest part in the subsidization of motor trucks as weapons of warfare.

Naturally, the situation abroad in every industry is chaotic. All automobiles and trucks have been requisitioned by the warring governments, and in most cases the factories are barely operating, if at all. As a result the manufacturers of both automobiles and motor trucks are unable to supply the demands of their own governments.

At the present time the warring nations are looking to America for trucks. There is hardly a truck company in this country that isn't negotiating with foreign representatives, either directly or indirectly, for the placing of truck orders.

Arrangements are being entered into by one company for 1000 steel armored trucks, which are being sold to France, Russia and Greece. Continental truck makers are not able to supply the trucks required by the various armies and, consequently, the powers turn to American manufacturers. It is said that some manufacturers are shipping trucks destined for England to Canada, whence they are reshipped.



Mobilization of French Motor Fleet Preparatory to Moving Supplies and Ammunition to the Front.

"SAVE THE HARVEST" IS CRY IN EUROPE.

"**S**AVE the harvest" is the cry heard on every hand throughout Europe. However, it would seem that there is very little hope of saving the har-

vest in many instances. In most sections it is impossible to reap, owing to the fact that the millions of soldiers have either trampled the crop down or may soon do so. Likewise, in localities that are free from danger or apprehension, there are insufficient men for the work.

It is in these sections that the motor equipped farming implements are showing what they are capable of. England, for instance, is experiencing an exceptionally abundant harvest, and it has been estimated that the increase in the yield will amount to approximately seven per cent. over the previous year's results. Also, there have been three per cent. more acres under cultivation this year than there were last.

It is stated that the assurance of a food supply has done more than anything else to keep up the spirits of the country. It was feared at first that England would be at the mercy of the enemy, inasmuch as the Germans might cut her off from the wheat supply of the United States, Russia and elsewhere. However, events as they have transpired show that England's navy is strong enough to hold a way open to the majority of the cornfields of the world.

Apprehension was similarly aroused by the action of the government in commandeering all horses from the farms throughout the country. England, like all of the other countries at war, saw itself handicapped in reaping the harvest owing to the threatened lack of men and animals.

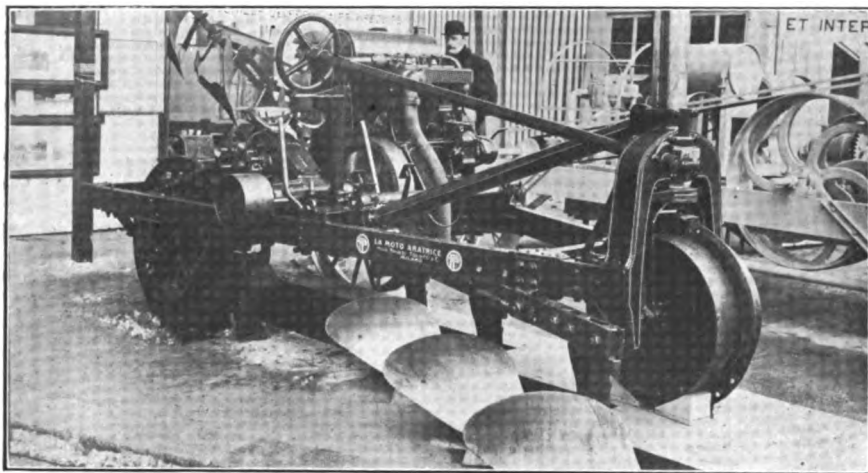
In actual experience, however, there has been no great scare as yet due to the absence of horses,

there are sufficient reapers, binders and other farming implements that are being hauled by agricultural tractors. The agrimotor is taking the place of six or more horses in every instance. Notwithstanding this, England does fear that a long siege will mean that not only the remaining horses will be commandeered, but all possible laboring hands will be ordered to the front.

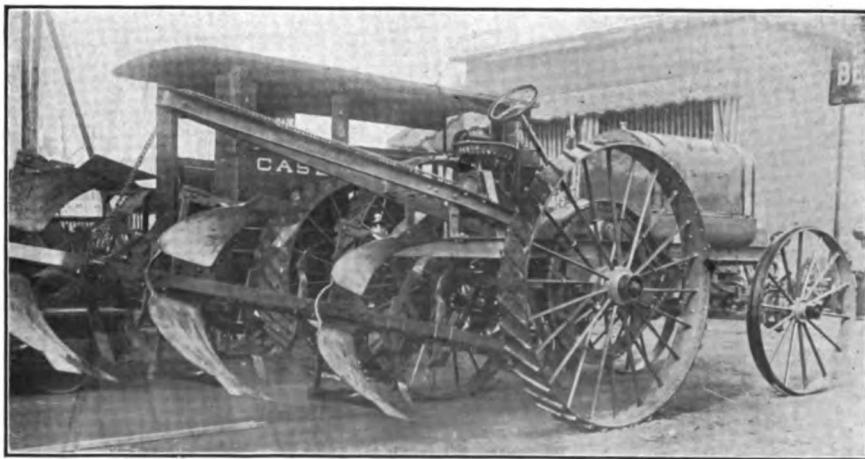
Most of the motor equipped farming implements that are being used by the farmers abroad are of the latest design. They include the Stock self-contained plow, of German manufacture; the Bauche hoe, made in France, and the International Harvester Company, Chicago, Ill., is well represented throughout Europe with its kerosene tractors as is the J. I. Case Threshing Machine Company of Racine, Wis.

An entirely new principle is involved in the Moto Aratrice, made in Milan, Italy. This is shown in the accompanying illustration, and it is seen that the Italian machine pushes the plowshares forward instead of pulling them. This machine is made in two models, one being rated at 16-20 horsepower and the other at 40-50. The front of the vehicle is mounted on a single, pivoted steering wheel, which is arranged to be raised or lowered to give the desired depth of the furrow.

The two-cylinder slow running motor is placed at the driver's left, his seat being located over the gear box. At the outer end of the shaft, extending through the gear box, is a sprocket, from which final drive is by chain to the right wheel. In this wheel is incorporated an eccentric drum or hub, which operates 12



Moto Aratrice, a Machine with a New Principle, the Plowshares Being Pushed Forward Instead of Drawn.



The Amlot, a Combination Plow and Tractor, Which Has Novel Arrangement of Plowshare Frame.

stout shafts connected at their outer ends to double-pronged blades pivoted between the side plates of the wheel. The eccentric action of the wheel in motion

causes these blades to project in order to provide traction. After leaving the ground the eccentric action causes them to lie flat with the tread, until they pass the top centre.

Another machine that is reported to be doing effective work in the fields is the Amiot, made in Rheims, France. This is a combination tractor-plow, in that the share frame can be removed and the remainder of the vehicle utilized as a tractor for various purposes about the farm.

The Amiot uses a four-cylinder Abeille motor, mounted at the forward end under the hood, with a radiator in front and the fuel tank at the rear. The drive is practically direct, there being only one speed either forward or backward, and power is transmitted to the 70-inch rear wheels by side chains.

One of the main features of this machine is the provision for turning the furrow either to the right or left, thereby making it unnecessary to make a circuit of the entire plot being plowed.

Another new machine being used abroad is the Plissonier, a mowing machine of an entirely new model. The construction of this instrument requires the use of a long frame, with a 6-8 horsepower motor mounted at the front, over a single pivoted wheel. The fuel tank is carried on a light support directly over the radiator, feed being by gravity. The operator is located well back of the rear axle, steering being by a vertical column.

The Stock motor plow, made by the Stock Motor-flug, Ltd., Berlin, Germany, likewise has the plowing attachment connected permanently to the frame of the vehicle, instead of being hauled by the latter as a separate instrument. Two driving wheels of large diameter, fitted with deep paddles to increase their grip upon the soil, are mounted in the centre of the frame. This is supported from the main axle and practically is balanced in a horizontal position. The motor, which is rated at 42-50 horsepower, is carried at the forward end of the machine, and is equipped with Bosch ignition. The carburetor is designed to operate on gasoline, benzol and other motor fuels.

A tractor capable of hauling two plows and a hoeing machine is being turned out by Vve. A. de Mesmay, Saint Quentin, France. These are specially designed for small farm work and will replace two horses. The tractor is mounted on four wheels, all of which are driving members, and is propelled by a two-cylinder, 15-horsepower Abeille motor. The hoeing machine has four wheels, and a one-cylinder, seven-horsepower Abeille motor. Two seats are provided, one in front for the driver, and the other in the rear for the man who manipulates the hoes. There are 18 of the latter, which are fixed to a transverse shaft.

The Safety First Society, New York City, has requested the police authorities in all cities throughout New York state to enforce the law requiring horse drawn vehicles to display night lights. The society says the law is being ignored.

HELD ANNUAL OUTING.

Motor Truck Club Members Give Over Day to Sports Programme.

The members of the Motor Truck Club of America and their guests enjoyed the annual outing of the organization Aug. 18 at the Marine and Field Club, Bath Beach, Brooklyn, N. Y., a company of about 200 participating in the different events. The greater part of the day was devoted to a programme of field sports, in which many who retained their knowledge and enthusiasm realized how necessary is practise to maintain proficiency.

The chief event of the daylight sports was a ball game that was played at traditional motor truck speed, the contestants being teams known as the "back-fires" and the "self-starters", captained respectively by David C. Fenner and George H. Duck, which was, according to Umpire Ellis L. Howland, won by both teams by a score of 2 to 2, with the losing team a close second. The tennis tourney was captured by John B. Eustis, and the golf competition was won by Nathaniel Mallout at match play, while the foursome was taken by F. B. Porter and C. W. Fletcher, who defeated Roderick Stephens and F. F. Philips.

Then followed a shore dinner, and the evening was devoted to dancing for prizes, in which all competitors started without handicaps, which was continued until a late hour. The event was arranged by a committee consisting of William S. Andrews, chairman; W. H. Perry, T. A. Aspel, Harvey Robinson and David C. Fenner. Because of his services in arranging the details of the outing, a silver mounted pipe was presented to General Manager Charles E. Stone by the members of the organization.

INTERNATIONAL MOTOR TRADE.

Max Dutray, a French acturarian, has prepared a table showing the international trade in automobiles was \$123,354,467 for 1913. This is merely the sales made by one country to another, and does not include the sales of each country in its own markets.

C. F. Chenevert and B. Havens have joined the staff of the Denby Motor Truck Company, Detroit, Mich. They will handle the export business of that concern.

The Miller Rubber Company, Akron, O., has purchased buildings formerly owned by the Franz Body Works, and plans to expand immediately.

There are 2800 motor trucks in daily use in Los Angeles, Cal., and these vehicles are valued at \$9,000.

NEW MEN WITH THE FEDERAL.

The Federal Motor Truck Company of Detroit has made several important changes in its organization. H. T. Sigwalt, formerly with the Fort Wayne, Ind., Corrugated Paper Company, has become advertising manager. R. G. Hargraves, who has been with the Cadillac Motor Car Company of Detroit, has been made transportation engineer. The sales organization now includes C. T. Cary, formerly manager of the truck department of the Peerless Motor Car Company, Cleveland, O., who is now eastern district sales manager. E. W. Hurd, who has been with the J. D. Whitmann Company, is district manager for Michigan, Ohio and Pennsylvania. L. L. Barnes, formerly with the Chalmers Motor Company, Detroit, is southeastern district sales manager, and Charles Case, who was with the Oliver Motor Truck Company, Detroit, has become sales manager for the southwestern territory.

MOTOR TRUCKS FOR WAR SERVICE.

The government of Canada has purchased 25 two-ton capacity motor trucks to send to the front with its contingent of colonial troops. These machines will replace horses, which have been used to draw supplies. Several companies furnished the trucks, as follows: Russell Motor Car Company of Toronto, eight; White Company, Cleveland, five; Packard Motor Car Company, Gramm-Bernstein Company, four each, and the Reo Motor Truck Company, four. The machines were furnished in quick time, some being delivered the second day after the order was sent in.

The United States consul at Lisbon, Portugal, reports that five different makes of American pleasure cars and two makes of light trucks were exhibited at a recent automobile show at Oporto. Eleven of one of the makes of light trucks exhibited have been purchased by the Portuguese government for military service.

The Day Tire Protector Company has been formed in Wilmington, Del., with capital of \$100,000 to manufacture motor car tires. F. K. Hansell of Philadelphia, Penn., and G. H. B. Martin and E. T. Vennel, both of Camden, N. J., are the incorporators.

The National Team Owners' Association, Philadelphia, Penn., has submitted to the Interstate Commerce Commission the results of an extensive study on the use of electric industrial trucks in loading and unloading freight cars and steamships.

F. H. Clark and R. W. Shutt, formerly factory representatives of the Willys-Overland Company, Toledo, O., have opened a distributing agency for Willys trucks in Sioux City, Ia.

FORM NEW SECTION.**Metropolitan Division of Electric Vehicle Association Is Organized.**

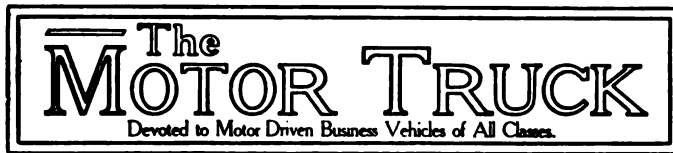
The formation of a New York section of the Electric Vehicle Association of America has completed the organization of that body so that each branch now is at parity so far as activities are concerned, and places each division on an equal plane, instead of the metropolitan body being nominally the principal division. When the association was organized the purpose was to have the activities as general as appeared practical, and to better convenience the endeavors of the promoters to have the officers from New York and vicinity, that meetings might be frequent.

Later on the New England section was formed for the benefit of the members in Boston and vicinity, and to better facilitate the promotion of the use of electric vehicles in the New England states. As the interest of the membership increased and the need of sectional activities were apparent a Chicago section was formed. Then came the formation of sections in Philadelphia, Washington, Cincinnati, San Francisco, Los Angeles and Pittsburg, with probability of others being organized.

Each section organizes with a chairman, who by virtue of his office is a vice president of the national association, so that the governing body consists of the president, vice president, secretary, treasurer and 12 directors, elected by the annual convention, and the chairman of each section. But according to the original plan of organization the national officers were the officers of the New York section, and the meetings of the New York section in a sense meetings of the entire association. While this was not objectionable from the viewpoint of the members, the situation was productive of complications, and that there might be systematization of the affairs of the organization the formation of a New York section, that would have the same relation as all the others, was believed to be desirable.

The formation of the association was completed with the choice of Harvey Robinson as chairman, David C. Fenner, vice chairman; David F. Tobias, secretary; Harvey Robinson, David C. Fenner, David F. Tobias, W. C. Andrews, T. C. Martin, S. W. Meneff, Nathaniel Platt, F. S. Sampson, Frank W. Smith, S. G. Thompson, Charles A. Ward and C. Y. Kenworthy, directors. This section has a membership of about 200, it being the largest division of the association in the country.

The Public Utilities Commission is studying conditions in the Philippine Islands with a view to devising means by which automobile transportation may be extended. Under the present system the competition rates are said to be ruinous.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

ARMY TRANSPORT MAINTENANCE.

Army highway transports are of enormous importance in warfare, a fact that has been amply demonstrated in the present European war, no matter how complete the railroad systems available, and sufficient provision should be made for maintenance of any equipment that may be owned by the government. By this is meant that the army units should be provided with motor vehicles equipped with such tools as might be used for field repairing, with tents that might serve for shelter of the workers, with lights so that work could be done at night, and with materials that would be useful for repairs and restoration, if carrying spare parts was inadvisable. Army transports are not spared in service. The work must be accomplished at any price, and good judgment would dictate the need of a complete field repair outfit being attached to each group of vehicles in service. These units ought to be provided now in part, developed by experience, and a standard established. To wait until a time when warfare has actually begun is the height of folly.

HIGHWAY TRANSPORTATION ECONOMY.

Railroad rates are constantly increasing, largely from the fact that the government, having permitted the watering of stock and over-capitalization of property, must allow the imposition of heavier burdens upon the people that the railroads can pay dividends. That is, the government is willing that the mass of

the people shall pay greater prices for service so that the stockholders of the railroads can have returns from their investments. Such a condition must exist so long as the people will tolerate it. To increased rail transportation cost must be added the expense of highway haulage. The short hauls for the railroad are the long hauls for motor trucks, and well equipped and carefully managed highway transportation companies can be made very profitable, not by charging reduced rates, but by giving more satisfactory service for approximately the same charge. This character of transportation appears to offer unlimited opportunities.

FOREIGN TRADE OPPORTUNITIES.

While the European countries now at war would probably purchase motor trucks and trailers in considerable numbers, these vehicles are contraband of war and would be subject to seizure were they by any chance to come into the possession of an enemy of the purchaser. For this reason shipments to any of these countries would be more or less of a risk. But the markets of the neutral nations are open, and exploitation of these is especially timely because of the cessation of shipments from Europe. The motor vehicle industries of England, France, Germany and Austria are demoralized and are not producing sufficiently to meet the demands made by the domestic purchasers, or even the parts that are necessary for the maintenance of the vehicles in army use. Italy's automobile industry is paralyzed and the same statement is true of the other nations not involved, which might be logical purchasers. While there is no doubt that the neutral countries may not be as large purchasers, because of the diminution of commerce, as though conditions were normal, there is without question a sufficient market to justify the serious attention of the American manufacturers.

THE MOTOR TRUCK CONVENTION.

Much interest obtains in the convention to be held at Detroit, Mich., Oct. 7-10, organized by the Motor Truck Club of America, and which will be participated in by a large number of manufacturers and those identified with the differing highway transportation interests. The determination of the National Automobile Chamber of Commerce to defer a proposed convention of truck manufacturers, leaves no obstacle to all individuals and concerns to take part in the activities of the assemblage, and to concentrate their endeavors to make the occasion a decided success. This is not a money making proposition other than in the sense that it will be generally promotive, but it will be as beneficial as those who have to do with its organization and conduct will make it by their activities and co-operation. This is a time and a purpose for which everybody can be a "booster" with the best of reason.

NEW N. A. C. C. COMMITTEES.

President Charles Clifton has appointed the committees for the current year to handle the various branches of the industry for the National Automobile Chamber of Commerce. They are:

Traffic: William E. Metzger, Argo, chairman; E. R. Benson, Studebaker, and R. E. Olds, Reo.

Patents: C. C. Hanch, Marmon, chairman; W. H. Van Dervoort, Moline; William T. White, White, and W. C. Leland, Cadillac.

Commercial Vehicle: Windsor T. White, White, chairman; Alvan Macauley, Packard, and H. Kerr Thomas, Pierce.

Electric vehicle: H. H. Rice, Waverley, chairman; F. R. White, Baker, and W. C. Anderson, Anderson.

Good roads: R. D. Chapin, Hudson, chairman, and S. D. Waldon, Packard.

Legislative: H. H. Rice, Waverley, chairman; G. H. Stilwell, Franklin, and J. I. Farley, Auburn.

Show: Col. George Pope, Pope, chairman; H. O. Smith, Premier, and Wilfred C. Leland, Cadillac.

WASHINGTON'S TRAFFIC LAWS.

On Aug. 10 new traffic rules became effective in Washington, D. C. One of the most important of the regulations is that no vehicle, except a commercial vehicle, loading or unloading, shall stand for more than 15 minutes at any place on 14th and 15th streets, between Pennsylvania avenue and I street, between 8 a. m. and 6 p. m. This is the most congested section of the city.

GERMAN LICENSING METHODS.

It has been said that a blind man may drive a motor car in the United Kingdom, as anyone can obtain a license upon the payment of \$1.25, irrespective of his driving qualifications. However, in Germany the method employed is slightly different. An applicant for a driver's license must first take a month's tuition license, which permits him to learn to drive. At the end of a month he is taken into the congested traffic districts and with an official by his side is made to drive in and out of the traffic. The slightest fault will cause him to be put back on the tuition list for an additional month. Often licenses are refused altogether. The result of this is that the accident percentage in Berlin is only half that of London, although the traffic is not as congested.

'BUS LINES POPULAR.**Natives Take Kindly to Motor Public Service in Philippine Islands.**

The value of rapid transportation is understood by all races of people, and while service requirements will differ largely, there will be but little variance in the primary object, which is to increase speed of travel. This purpose accomplished, convenience and even luxuries are then to be considered, and the demand for these depends in great measure upon the customs of the people, for each race has its own standards.

An illustration of what may be regarded as rapid transit, yet with seemingly primitive provision for the comfort of the passengers as judged from what would suffice to attract the public in the United States, is a public service line from Zamboanga, a seaport town in the province of Amboanga, which is the southwestern part of the island of Mindanao, Philippine Islands, where the population is largely made up of Filipinos, Chinese, Japanese and half breeds, in which the principal and influential element is composed of Americans and Spaniards.

From this town roads extend along the coast in either direction to other towns of less importance, and until Patrick H. Frank of Zamboanga imported two B. A. Gramm's ton truck chassis, communication with them was either by boat or animals, the cart paths being along the lines of least resistance and to suit the convenience of the travellers. Despite the virtual lack of roads and the conditions that make operation expensive, and the necessity of low prices because of lack of means amongst the people, Mr. Frank bought the two machines and inaugurated with them two lines of public service over routes about 20 miles long.

As will be noted from the illustration the trucks have platform bodies fitted with four transverse seats



One of the Two B. A. Gramm's Ton Trucks Used in Public Service Between Zamboanga, Philippine Islands, and Surrounding Towns with Satisfactory Results.

that will each accommodate five passengers, they being entered from either side from running boards that are outside of and extend back of the rear wheels. Roofs supported by stout steel stanchions cover the platforms from the dashes to the backs of the rear seats, and the passengers are protected by side and end curtains in the event of rain. The seats are comfortably upholstered and cushioned.

Each 'bus is driven by a native, with a Chinese conductor, and they make two or more trips each way, daily carrying freights characteristic of the population. On the trip during which the picture was made the passengers were mostly natives and Chinese. In a recent letter to the Gramm-Bernstein company, Mr. Frank stated that he was more than pleased with the trucks, and that though there were practically no roads such as Americans might desire for satisfactory usage, the machines were operated on schedule and were well patronized. The drivers had absolutely no knowledge of machines until they were employed, but they quickly learned and were reasonably efficient. In the Philippines telephone lines are built in many of the islands, but the stations are not frequent between villages, and that communication may be had with the office of the company the drivers carry with them a field telephone receiver and transmitter and a coil of wire. In the event of need the drivers climb poles, attach the connection and call from wherever they may be. The field telephone is shown at the left of the driver's seat in the illustration. This equipment is particularly serviceable, and while thoroughly practical where it is used, would not be useful in the same sense in localities where connections must be made through exchanges.

The antipathy of the natives and the Chinese for each other is the protection of the owner of the lines against the dishonesty of the conductors, for while no system of checking fares is used, the driver is expected to see that the conductor turns in the full amount of his collections, and the conductor in turn serves as a safeguard so far as the rational operation of the machine is concerned.

WANTS THE PAPERS RETURNED.

A stockholder of the Imperial Valley Trading Company, Ltd., has brought suit against the Moreland Motor Truck Company, Los Angeles, Cal., claiming the latter forcibly took charge of the offices, books and motor trucks of the Imperial company. The purpose of the suit is for the truck concern to give an accounting and return the books and papers.

The Pittsburg Motor Car Company has been formed in Wilmington, Del., with capital of \$100,000 to manufacture motor cars and all kinds of motors. J. M. Frere, H. J. Davis and G. Shearer are the incorporators.

HAYING WITH A MOTOR TRUCK.

Haying is work that is generally done in hot weather, and often because of necessity the hours of labor are from daylight to dark, which is very severe upon men and animals. Such combination of conditions resulted in the death of two horses owned by W. H. Porter of Ingham county, Michigan, and with the hope of preventing further loss of animals he decided he would try to use a Reo truck as a tractor to haul a horse mowing machine.

One of the advantages of horses is the closeness of the work that can be done, for grass can be cut in corners and very near obstructions, which is not possible with a tractor drawn machine, especially when equipped with a pole. But as against this is the superior speed of the machines and the continuity of service. Mr. Porter bought his truck for road work, hauling products and supplies, and he turned to it for mowing with the knowledge that it might be much better adapted.

The result, however, was surprising, for two acres were mown in an hour and 40 minutes, and this despite more or less experimenting to get accustomed to the work. Two men, however, were necessary, the one to drive the truck and the other to manipulate the mowing machine.

TRUCK COVERS 40,000 MILES.

A 1500-pound White wagon, owned by the Springfield (Mass.) Ice & Coal Company, has been driven 40,000 miles since Aug. 31, 1912. It is used by the superintendent of the company as a general utility machine, carrying men and equipment to and from the different plants and taking out emergency loads of ice or coal.

STRICT ABOUT LIGHT LAW.

New Hampshire authorities are strict regarding the new law compelling all vehicles to carry lights at night. The first offender was a Newfields man, who suffered a fine of \$5 and costs for failing to have a lamp lighted.

The Canadian Bull Tractor Company, Winnipeg, Can., has been formed with \$1,000,000 capital to manufacture motor trucks. W. H. McWilliams, A. R. Argraft, J. S. Loudon, W. J. Cummings, R. M. Wolbin, Walter Pace, L. A. Cannon and H. F. Williams are the incorporators.

The National Spring Wheel Company, St. Joseph, Mo., has been formed to engage in manufacturing metal wheels for motor cars. W. L. Mann, W. P. Justice and E. J. Kearby are the incorporators. Capitalization is \$100,000.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXV--Construction and Operation of National Magneto, Which Differs from Conventional Design in That Circuit Breaker Mechanism Is Mounted on the Distributor Shaft and Rotates at Camshaft Speed.

By C. P. Shattuck.

IN ALL of the numerous types of magnetos discussed, the method of interrupting or breaking the primary current generated by the instruments is

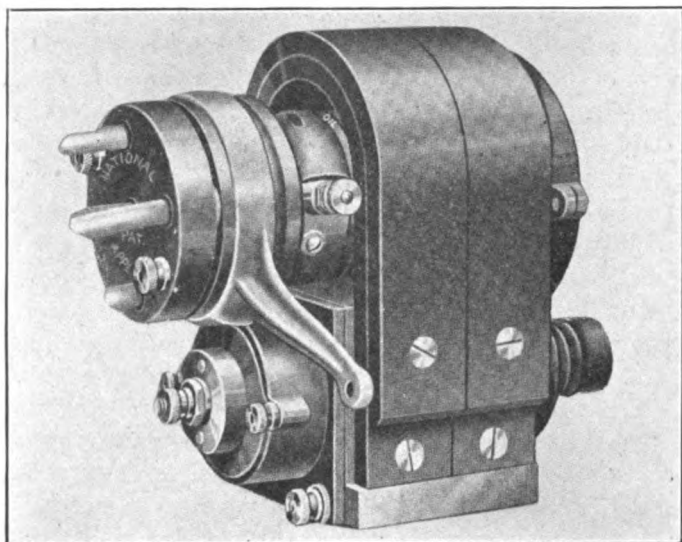


Fig. 158—The National K 4 Magneto, Which Differs from Conventional Practice in the Location of Circuit Breaker and the Distributor.

similar. It will be recalled that there are two, one in which the armature shaft carries a cam which actuates or separates the platinum contact points, and the other in which the breaker mechanism is attached to and revolves with the armature shaft, such as the Bosch, for example.

With every type presented in this discussion, the breaker housing and its components are separate from the distributor; that is, the latter is mounted above the breaker box and its arm or distributor brush is driven by a gear. This gear is generally provided with twice as many teeth as the driving member on the armature shaft. It was also shown that the primary current is interrupted twice each revolution of the shaft and that, to obtain four sparks, the armature shaft makes two complete revolutions to one of the distributor.

Features of National.

An instrument that differs from conventional practise is the National K 4 magneto, manufactured by the National Coil Company, Lansing, Mich., several views of which are shown herewith. The most radical departure from the usual design is the location of the circuit breaker mechanism and the speed at which it is driven. By referring to Fig. 161 B, showing a longitudinal sectional view of the instrument, it will be

seen that the circuit breaker is located on the half-time or distributor shaft, and that the driving and driven gears are located at the rear of the instrument, whereas they are generally fitted at the front.

Indicating Window.

Another feature of the National is the timing or indicating window shown at Fig. 159 and Fig. 161 A. Attached to the rear or driving end of the distributor shaft is an arrow, and included in the indicating method is a dial having figures 1, 2, 3 and 4. With the head of the arrow registering with figure 4, for example, as shown at Fig. 159, it indicates that the member distributing the high-tension current is in contact with the connection of the wire leading to the No. 4 cylinder of the motor. This construction facilitates the work of timing the instrument, should it be removed for repairs, etc., and enables a novice to easily identify the proper connections between the distributor housing and the spark plugs. As may be noted from the illustration, the direction of rotation of the distributor is indicated by an arrow which denotes that the magneto is driven clockwise looking at the driving end.

Fig. 158 shows a three-quarter exterior view, as well as the location of the distributor and the inter-

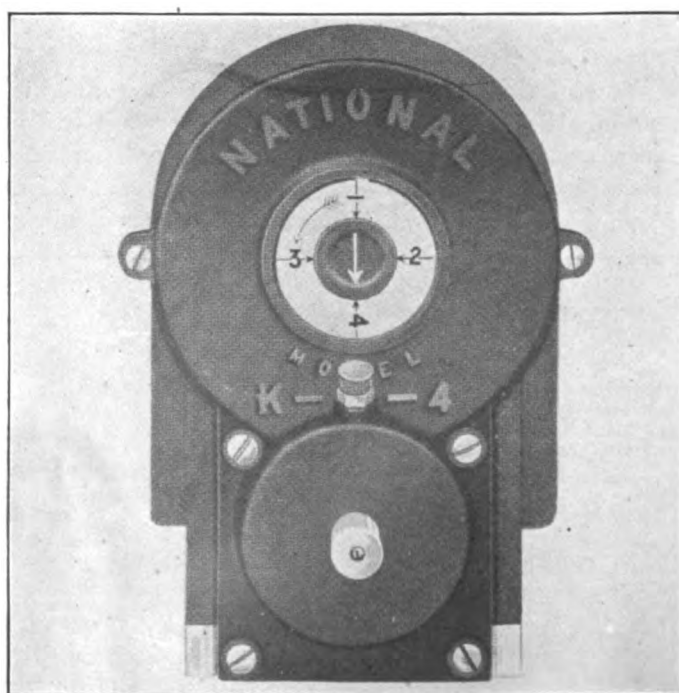


Fig. 159—Rear View of National Magneto, Showing the Indicating Window—A Travelling Arrow Points to a Figure Representing Cylinder on Compression.

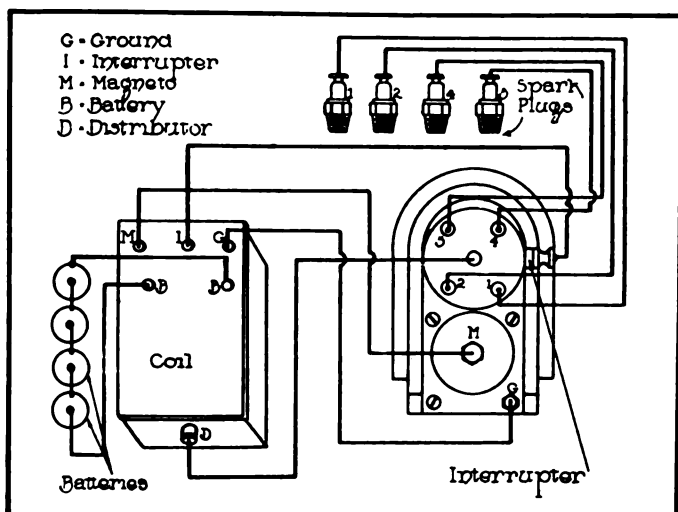


Fig. 160—Showing the Wiring Plan of National Four-Cylinder Magneto Providing Dual Ignition.

rupter mechanism. As may be noted, the circuit breaker mechanism is between the distributor and the magnets, and is provided with a lever or arm for advancing or retarding the spark, obtaining variable ignition.

The interrupter mechanism follows conventional practise, and the break of the primary current is accomplished by the use of a cam attached to and revolving with the distributor shaft. By referring to Fig. 161 C it will be seen that this cam contacts with a roller carried by a pivotally mounted lever. The last named member is fitted with a fixed platinum screw which normally is in contact with an adjustable platinum screw secured to the circuit breaker housing. When the cam attains a certain position in its rotation, it moves the roller and lever outward, separating the contact points and thereby interrupting the primary current of the batteries or that generated by the magneto.

Ease of Adjustment.

One of the qualities claimed for the National circuit breaker mechanism is that the movable platinum screw can be adjusted with the instrument operating. The screw is provided with a slotted head and, by employing a suitable screw driver, it may be turned in or

out, obtaining the required adjustment of the points. Another feature of the National is the incorporation of a large oil reservoir with a ring oiler for lubricating the distributor shaft. It is claimed that the supply will not require replenishing oftener than every 5000 miles.

Low-Tension Current.

The National magneto is a low-tension instrument, as its armature carries but a single winding of primary wire. The high-tension electricity required to overcome the resistance of the air gap of the spark plugs is obtained by the use of a transformer coil, and the intensifying of the current is in the conventional manner.

The current generated is collected by brushes and the contact plates are stated to be of the hardest steel, ground and polished. The brushes are ample in size, insuring efficiency and durability. The brush cover is retained by knurled screws, and it is stated that the construction is dirt and moisture proof.

Distributor Assembly.

The distributor housing is retained by two knurled thumb screws which, when removed, allow the housing to be withdrawn, after which the travelling distributor contact may be displaced by sliding it forward, being retained by two rod or stud-like members.

The wiring plan is shown at Fig. 160. As may be noted, the system provides for the service of dry cells or a storage battery as an auxiliary source of current supply. When the magneto is supplying the electricity, the current is collected by the brushes at M and led to the coil, where it is intensified. The high-tension current flows from the coil to the distributor, where it is distributed in the conventional manner to the proper spark plug. With this system, both the positive and negative leads from the batteries are connected to the coil, not grounded. The ground wire of the magneto is indicated at G. The wiring plan is simple and a little study of the diagram will reveal the path of the currents. The National switch is of the dash kick type and provision is made for starting on the spark or compression by depressing a button.

(To Be Continued.)

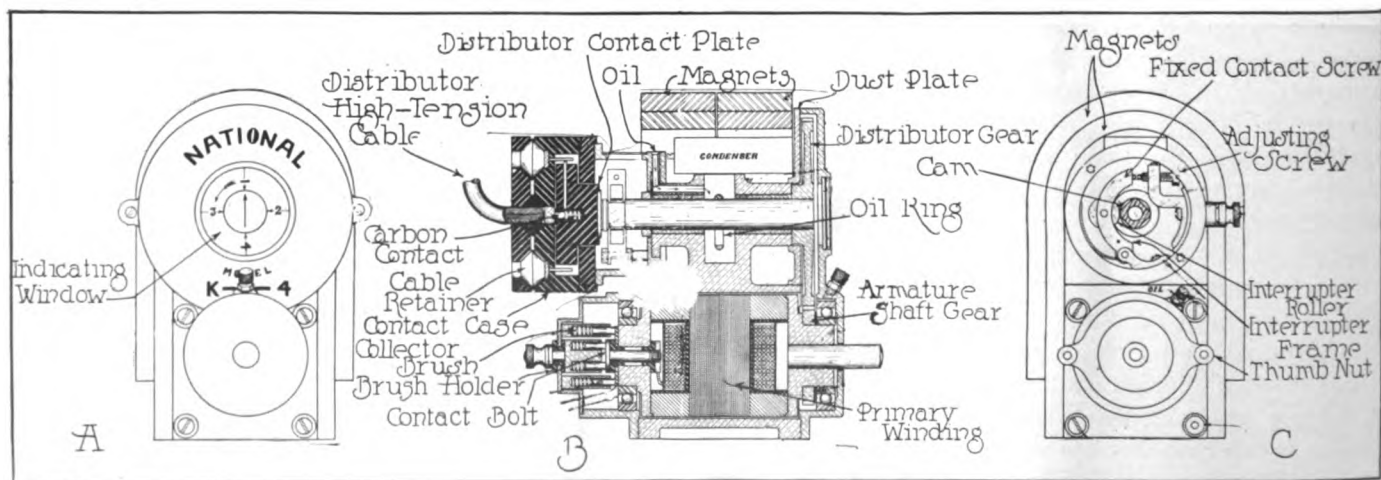


Fig. 161—National K 4 Magneto, a Low-Tension Instrument Utilizing a Coil to Intensify the Current; A, the Indicating Window; B, Sectional View; C Showing the Interrupter Mechanism.

CORRESPONDENCE WITH THE READER.

Radiators—X Y Z, Wilmington, Del.

We are rebuilding a pleasure car for trucking, and require a new radiator and hood. As the machine is not being manufactured and we cannot obtain a similar radiator, we propose to fit another type. Would appreciate any suggestions as to making measurements of the parts.

At Fig. 1 is shown a diagram indicating the principal dimensions to be noted when fitting a new radiator

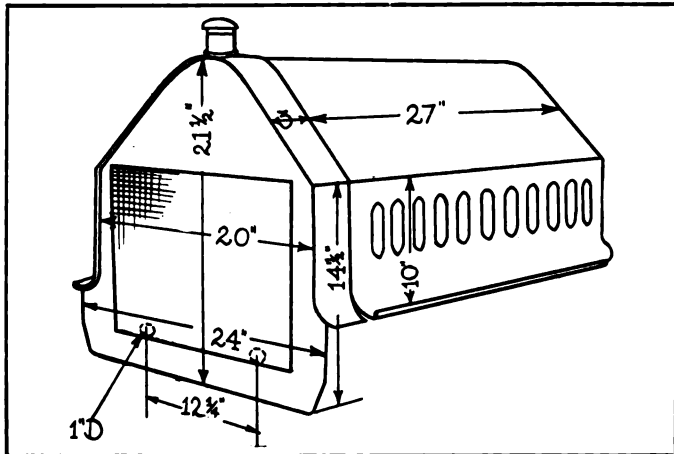


Fig. 1—Dimensions to Be Observed in Fitting the Radiator and Hood.

and hood. The width is important, as is the method of support as well. It is also advisable to so mount the radiator that it will not be subjected to road shocks and movements of the frame. No difficulty should be experienced in obtaining a type which will fulfill the requirements, as many concerns deal in second-hand radiators which could be successfully utilized on the machine mentioned.

Thermo-Syphon Circulation—Reader, St. Louis, Mo.

Kindly explain for the benefit of a reader of the MOTOR TRUCK how the water is circulated by the thermo-syphon system of cooling, and what are the advantages of it.

It is well known that the specific gravity of water decreases as its temperature increases, or, in other words, that hot water is lighter than cold. In a circuitous system of piping arranged in a vertical plane in which water is contained, if a portion of the water is heated, its consequent lighter weight will cause it to be displaced or forced upward by the colder or heavier water. There will be a movement of the fluid through the entire system and, if the heat is continuously applied, the circulation will be maintained, for the water, in passing through the system, will lose some of its heat and gain in specific gravity. The rapidity with which the water circulates depends upon its maximum and minimum temperatures. It is this principle that is applied to motor vehicles in the thermo-syphon system of cooling.

At Fig. 2 is shown the thermo-syphon system utilized in Overland cars. As may be noted, the tops of the cylinder jackets are connected by a pipe or outlet water manifold to the top of the radiator, and that the lower section of the water jackets are connected to a pipe or inlet water manifold.

The water enters the water jackets at A and, upon becoming heated by the burning of the mixture, rises to the top. It then enters the pipe B and, passing into the radiator D, is cooled. Upon becoming cooled and heavier, it sinks to the bottom of the radiator, passing again into the cylinders.

The use of the thermo-syphon system requires ample sized water jackets and straight pipes, and the last named are larger in inside diameter than those utilized with a pump circulating system. The advantages claimed for the thermo-syphon system are: The elimination of pumps, stuffing boxes, etc.

Charging Battery—Information, Boston.

Is there any way to use the flywheel generator of the Ford car to charge a storage battery?

The flywheel magneto of the Ford machine cannot be utilized to charge a storage battery, as it generates an alternating current. A direct current is essential for charging. To utilize an alternating current a rectifier must be employed. The writer understands that a number of attempts have been made by electrical engineers to construct a device for using the Ford flywheel magneto for charging purposes but, up to the present time a practical system has not appeared upon the market.

Carburetor Floods—C. T., New Haven, Conn.

What causes a carburetor to flood? Mine floods all the time. It has a cork float.

Generally flooding of a carburetor is caused by the float being too heavy. Sometimes dirt or foreign elements in the fuel prevent the inlet fuel valve from seating, but in the case mentioned it would appear that the trouble is due to the float being fuel soaked.

Remove the float and dry it carefully, then give it one or more thin coats of shellac. It is important that the fuel level recommended by the maker be ob-

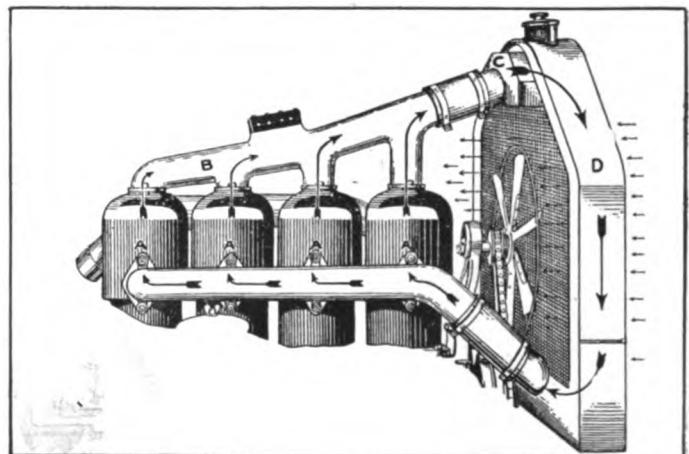
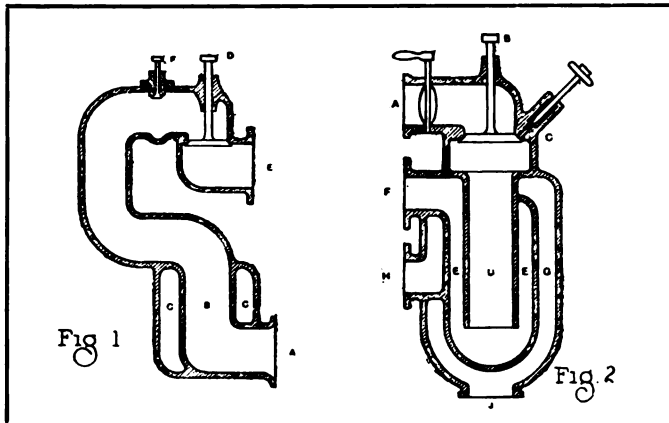


Fig. 2—Showing the Flow of the Water in the Thermo-Syphon System of Cooling.

served in replacing the float. The level may be tested by filling the float chamber with gasoline and noting the height of the float. It should not be above the spraying nozzle.

POSSIBILITY OF ALCOHOL AS A MOTOR FUEL.

IN VIEW of the fact that the Royal Automobile Club of Great Britain has opened a subscription list for the purpose of defraying the expenses contin-

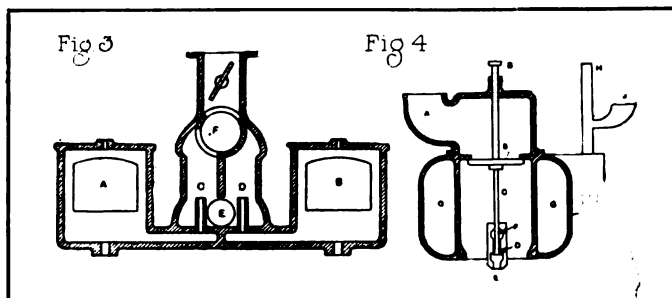


Alcohol Carburetors: At Left, Exhaust Jacketed Air Intake Type; at Right, Vaporizer for an Oil Engine.

gent upon the investigation of alcohol as a possibility for a motor fuel, the subject of alcohol carburetors is of interest. One English authority on carburetion holds that special designs will be required in addition to remodelling the motor, and that heating will be necessary. This view is indorsed by Dr. Ormandy, who points out that, even with a high addition of benzol, an experimental engine would not operate smoothly until the temperature of the jacket of the intake manifold attained 160 degrees Fahrenheit.

In discussing the possibility of alcohol as a fuel, one authority points out that the following factors must needs receive attention: Starting, fuel disintegration under all motor speeds, air supply, mixing and heating, particularly with the variable speed, variable load, automobile engine.

Inventors have been working to obtain a practical device for carburetting alcohol, and the accompanying illustrations give some idea of their efforts towards solving the fuel problem. The difficulty of starting on heavy fuels can be overcome by the utilizing of a highly volatile fuel, but one authority states that, upon changing to alcohol, condensation will occur un-



Alcohol Carburetors: At Left, Compound Type; at Right, Hot Water Heated Construction.

less the intake manifold be provided with a heating jacket, maintained to at least 160 degrees Fahrenheit.

Fig. 3 illustrates a type which is claimed to possess

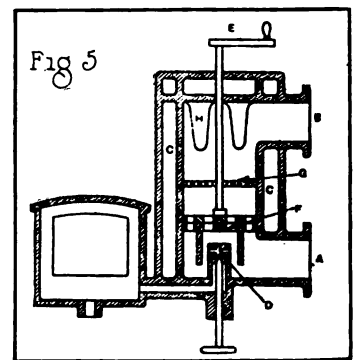
merits by its inventor. It is fitted with two float chambers, A being utilized for alcohol and B for benzol. Two jets are provided, C for alcohol and D for benzol. The air supply is at E and it is drawn past jets C or D, according to the position of the two-way, change-over valve F. In the sectional view the valve is shown so set that the air currents flow past the alcohol jet and past the throttle indicated, thence to the engine.

An example of a water heated alcohol carburetor is shown at Fig. 4. In discussing this design one authority states that it is well adapted to alcohol, that the heat of the water, which would tend to induce pre-ignition in gasoline motors, is particularly suited to an alcohol engine. As may be noted from the drawing, the air is heated, and nothing in the nature of a specific heated mixing chamber is provided. The diagram shows an air inlet valve having an extension rod, so that when the inlet valve opens, the rod actuates a small fuel valve, much in the same manner as is used on some heavy fuel vaporizers. The time of entry of the fuel and air is synchronized in a simple manner.

Air enters at A, B is the air inlet valve, and C an extension rod operating the fuel valve D. The alcohol emerges from the nozzle piece E, the air rushing around this, spraying the fuel, the supply being controlled by a separate horizontal needle valve F above D. The compartment between the air and fuel valves is kept heated by hot water circulated in the jacket G. The circulation pipe is shown at H, and it has a hand filler J for hot water when starting from cold.

The types of exhaust heated carburetors are divisible into two classes. Those at Figs. 5 and 2 have heated mixing chambers, while that at Fig. 1 has air heating, so that the engine exhaust is used in the one case and hot water in the other. In Fig. 1 the completed mixture passes the main inlet valve. Air enters at A, passes through B, jacketed by the exhaust gases at C, and is so drawn into the engine at E. On its way it absorbs fuel at the valve F. The alcohol is supplied through this valve, which is opened and timed by an engine gear. The fuel is, therefore, sprayed by air rush.

Much useful data have been acquired by those experimenting in alcohol carburetion from the stationary types of alcohol motors used abroad, but one writer calls attention to the fact that these have a constant



Exhaust Jacketed Carburetor with Variable Choke Tube.

load and temperature, and that it is a simple matter to maintain the correct heat for vaporization and constancy of temperature. The regular piston speed also insures a constant air blast for pulverization of the fuel.

Such a formation as that indicated about the fuel inlet nozzle at F in Fig. 1 is held not to be practical with automobile motors, as a constant and generous airway opposite the jet will not obtain the same force for breaking up the fuel at varying motor speeds. It is further held that alcohol requires effective spraying.

The design shown at Fig. 5 utilizes the constant level float feed chamber. Air enters the carburetor at A, and leaves it carburetted at B. Around the mixing chamber is an exhaust jacket C, so that considerable heat may be obtained. The supply from the float chamber is controlled by a needle valve D, operating in a jet as indicated, which has small holes, giving a side emergence, and employing a cross air blast. Around jet is a choke tube, and more or less air can be shunted away or directed around the nozzle by means of the lever E attached to a circular plate having a series of holes in it, which shut off or open holes in a fixed plate F. At G is a grid to assist in breaking up the fuel. The cover plate to the exhaust jacket carries fins to assist in heating.

The amount of heat utilized by some designers in carburetting alcohol is shown at Fig. 2, an old and useful device for petroleum engines. The air enters at A, passing the valve B, and proceeds down the central chamber D. E E are the atomizing chambers, and F the outlet to the engine. The exhaust jacket is indicated at G and H is the exhaust gas inlet. The gases pass out at J. The compartment E is filled with iron spirals to convey the heat of the exhaust to the chamber D.

WILL COMPETE WITH RAILROADS.

Six 2½-ton trucks will run on regular schedule through the fertile Imperial valley and San Diego, Cal., a distance of 122 miles. Part of the trip is over mountain roads and through sections of the desert which have not been reclaimed. Many of the farmers in the valley are 30 miles from a railroad station, and 40 per cent. of their product is spoiled while waiting for infrequent freight trains to the San Diego, Cal., markets. The motor trucks will save this loss by quicker transportation.

A permanent organization of all KisselKar truck drivers in the city and county of Milwaukee was organized last week. This movement was fostered by Frank J. Edwards, president of the KisselKar Company, Milwaukee, Wis.

The Mais Motor Truck Company, Indiana, Ind., has decreased its capitalization from \$1,000,000 to \$200,000.

EXPORTS EXCEED \$40,000,000.

The largest volume of automobile exports ever made for the same period of time was during the fiscal year that ended June 30 last, when the total shipments reached a value of \$40,136,565. This included Alaska, Hawaii and Porto Rico. In 1913, which was the previous high year, the exports totalled \$39,325,000, so that 1914 showed an increase of \$911,565, or 2 1/3 per cent.

The exports for the past year included 30,136 completed cars, valued at \$27,797,642; tires, \$4,159,454; motor car engines, \$1,391,893, and miscellaneous parts not specified, \$6,787,575. Europe bought nearly one-half of our entire sales of motor cars to foreign countries last year, although some shipments to European ports were for reshipment to other parts of the world. The exports to the United Kingdom included 7222 cars, valued at \$5,853,127; to Germany, 1435, valued at \$1,059,249; to France, 1429, valued at \$224,130, and to other countries in Europe, 3271, valued at \$2,580,428.

Canada and Australia were important markets, taking 4624 cars, valued at \$5,919,776, and 4244 cars, valued at \$3,695,595, respectively. This last figure includes other British Oceania in addition to Australia. Only 1985 cars were exported to the whole of South America during the last fiscal year. These were valued at \$1,939,212. Mexico took 167 cars, valued at \$256,675.

Every year during the past decade, with the exception of 1908, has shown an increase in the value of American automobiles exported to foreign countries. The value of motor cars exported in 1904 was \$1,895,605, and \$5,387,021 in 1909.

While there has been a steady growth in exports, there has been a corresponding decrease in imports. The total has fallen from 1624 cars in 1909, valued at \$2,905,391, to 300 cars, in 1914, valued at \$620,493. This is a new low record for automobile imports. For 1914 134 cars were from France, 40 from the United Kingdom, 55 from Italy and 21 from Germany.

LONG LIFE OF MOTOR TRUCKS.

John Muldoon, a professional operator in Chicago, Ill., who owns 24 motor trucks, states that with proper care and administration a motor wagon will last forever. Mr. Muldoon has a ton motor truck purchased April 16, 1904, which has been driven 135,000 miles and is today, according to the owner, in better condition when purchased.

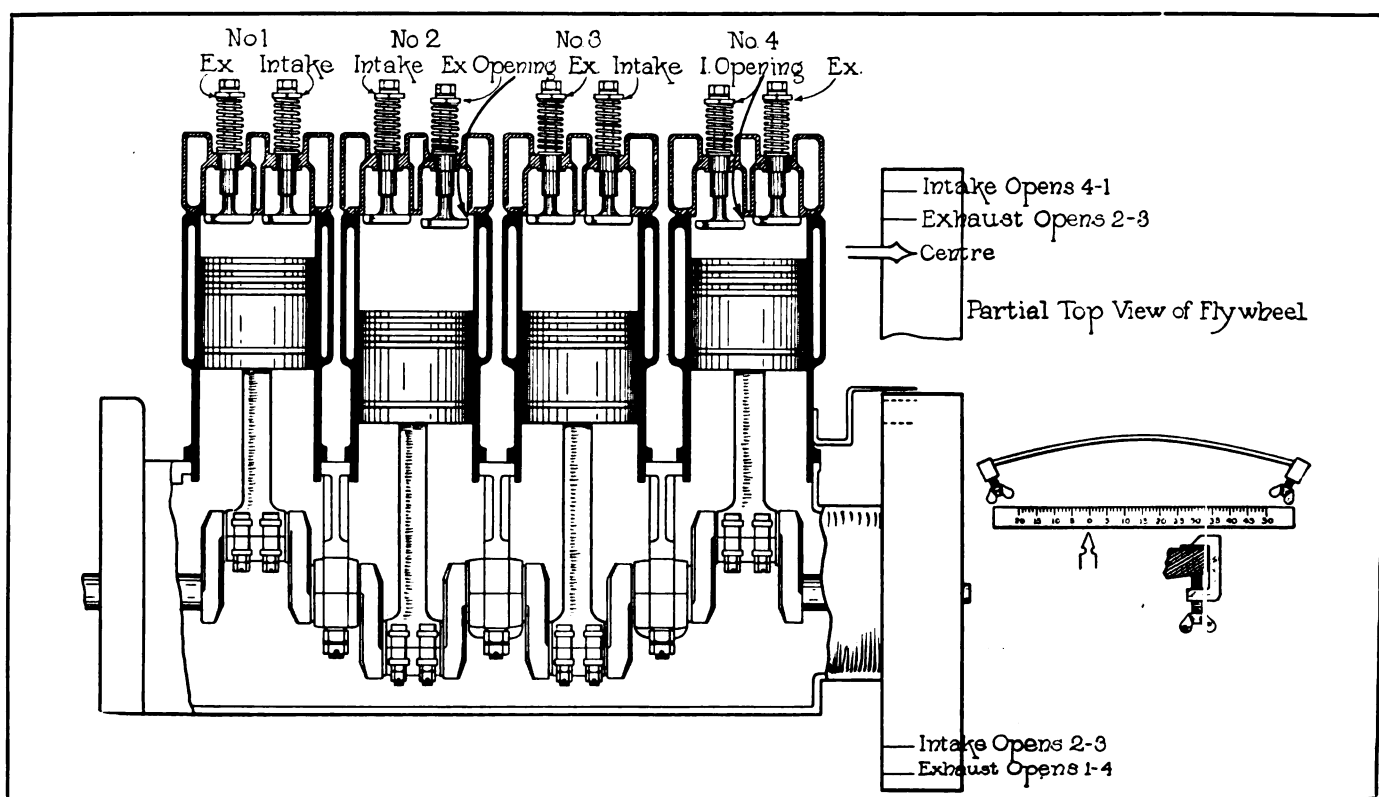
The Safety First Motor Car Company, Kalamazoo, Mich., has been incorporated for \$10,000 to manufacture motor cars and motor trucks under a patent secured by Frank Dentler of Vicksburg, Mich. Temporary offices have been opened in the Kalamazoo National Bank building.

HINTS FOR PROPER MAINTENANCE.

THE opening and closing points of the valves are important factors in the efficient operation of the internal combustion engine. Variation is caused by wear at a number of points such as cams, rollers, tappets, pushrods, etc., as these components are subjected to considerable service. Generally the most wear occurs in the tappet and on the end of the valve stem, causing the valve to open late and not lift high enough, thus retarding the flow of the mixture to the cylinder.

Generally the opening and closing points of a motor are marked on the periphery of its flywheel by the manufacturer. The figures and letters and their ap-

If it be remembered that the explosions of a four-cylinder, four-cycle motor do not occur in consecutive order, that is, the arrangement of the crankshaft is such that two pistons are up and two down at the same time, as indicated in an accompanying illustration, the timing will be simplified. Referring once more to the sectional view of a motor, it will be seen that the piston of the first cylinder (that nearest the radiator) has completed the compression stroke, that both valves are closed, and that the mixture is ready to be ignited by the spark. The pistons of the second and third cylinders are practically at the bottom, these being ready to begin the exhaust and compression



Illustrating How Valves Are Timed and Tappets Adjusted by Utilizing Markings on the Flywheel.

FIRING ORDER, 1-2-4-3.				FIRING ORDER, 1-3-4-2.			
Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4	Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
1—Firing	Compression	Exhaust	Suction	1—Firing	Exhaust	Compression	Suction
2—Exhaust	Firing	Suction	Compression	2—Exhaust	Suction	Firing	Compression
3—Suction	Exhaust	Compression	Firing	3—Suction	Compression	Exhaust	Firing
4—Compression	Suction	Firing	Exhaust	4—Compression	Firing	Suction	Exhaust

plication are puzzling to the novice, but are understood easily if the motor's cycle of operation be taken into consideration.

The figures 1, 2, 3, 4, represent the cylinders, while the letter I indicates the intake valve and the letter E the exhaust valve. Thus the combination I, O, 1, 3, signifies the opening point of the intake valves of the first and third cylinders. Another set is I, C, 2, 4, which indicates the time the intake closes. Similarly, E, O, 1, 3, means the opening point of the exhaust valves of the first and third cylinder. E, C, 1, 3, is the closing point. The letter C is generally employed for denoting the top and bottom centres.

stroke respectively, as may be noted in the drawing.

The firing order of the motor is 1, 3, 4, 2, which means that the charge is ignited in this order. Another firing order is 1, 2, 4, 3. In either case, however, there are four strokes of the piston and two revolutions of the crankshaft to obtain one impulse or firing stroke. By referring to the firing order below the illustration it will be seen that the sequence of the strokes is: Firing, exhaust, compression and suction or intake. By utilizing these tables one may become familiar with the order of explosions and these figures may be utilized in timing where the flywheel is not marked.

Where wear has taken place at the tappet or valve stem, and these members are adjustable, the efficiency of the motor can be improved greatly by resetting to conform with the figures on the flywheel, previously mentioned. While some makers advise the use of a business card, inserting it between the valve stem and tappet, the better method is to utilize the flywheel marks.

Generally an indicator in the form of an arrow is fitted to the motor and its parts to facilitate the work of the timing, but if the engine be not thus equipped, it will be necessary to make a mark on the cylinder to indicate the centres. The mark may be checked by placing the piston of the first cylinder at the top of its stroke, or by having the crank throws vertical.

As has been previously explained, the crankshaft makes half a revolution to each stroke. Referring again to the drawing, it will be seen that the first cylinder is about to fire and that both valves are closed. The exhaust of the second is about to open. If the timing be correct the indicating arrow will register with the line on the flywheel marked E, O, 2, 3. If late these figures will pass by the indicator and the tappet of the exhaust valve of the second cylinder should be lengthened until the valve starts to lift with the arrow and line coinciding.

By moving the flywheel slightly the marks I, O, 4, 1, should appear as the intake valve of the fourth cylinder starts to lift, and if it does not the adjustment of the tappet should be altered. If the flywheel is now given approximately half a turn the markings for the exhaust valves, 1 and 4, and intake, 2 and 3, will appear and can be checked. If the closing points are included in the markings on the flywheel, it is advisable to utilize them.

When the flywheel is not marked the timing will have to be secured from the factory. A gauge will be useful in the work, and one can be made from a strip of brass about 1/16-inch thick and about one inch wide. The length of the material will depend upon the diameter of the flywheel, and as the general average is about 15 inches, a foot of metal will be sufficient. The fraction of an inch that equals a degree is figured out and marked on the brass as indicated in the drawing. This is essential, as generally degrees are utilized. The degree can be calculated easily as 360 degrees equal a circle.

In employing the gauge the top and bottom centres of the flywheel are located, and while these may be obtained by inserting a rod through the opening of the compression cock, the better method is to remove the crank case or a baffle plate and make sure that the crank throws are exactly vertical and the piston is at the top of its stroke. In fine timing some allowance should be made for wear of the timing gears, play in the bearings, etc.

After locating and marking off the centres on the flywheel, and providing an arrow or other indicating mark, the gauge is clamped or secured to the flywheel as shown in the illustration. The degrees in inches

are then laid off and the timing may be checked.

All corrections should be made with the motor warm in order to obtain the best results. The relief cocks should be opened, or better still, the plugs taken out of the cylinders, so that the flywheel may be rotated easily. If the compression is not relieved it will be difficult to turn the wheel by hand, as well as maintain it in the position desired. The adjustment of the valve openings is a simple matter and the operation will be facilitated by studying the accompanying illustration, which was drawn to make clear the valve openings and the markings on the flywheel.

CARE OF OIL CUPS.

When oil cups are fitted to chassis components, and especially where they are exposed to the road dust, never renew the supply of lubricant without first cleaning the cup. Road dust is an abrasive and if not removed from the cup it is likely to be carried to the bearing part, increasing wear.

ANNEALING WIRE.

Hard or tempered wire may be rendered pliable by heating it red hot and allowing it to cool slowly. If a piece of flexible wire is required on the road and that in the tool box is too stiff, it can be annealed by placing it in the flame of the acetylene lamps.

COMMON SENSE BORING TOOL.

W. W. Blakely, 100 Leicester Court, Detroit, is manufacturing the Common Sense boring tool, made in two parts, and designed for service on milling machines, lathes, etc. The shank and barrel are integral, and the dial and holder are combined. The tang of the tool does all of the driving and calibration is by the vernier system reading in thousandths. Throwing the two eccentrics opposite each other centres the bar, and changing the inner eccentric's position enlarges the cut, giving a total expansion of .5 inch or more. It is made with .625, .75 and .875-inch boring bars. A toolmaker's size is also made. Prices and particulars will be forwarded by the maker on request.

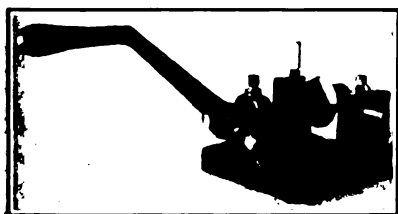
At the September meeting of the New Jersey Automobile Trade Association it will decide whether or not an automobile show will be held in Newark, N. J., this year. Dealers in that city claim that the shows no longer serve a useful purpose.

M. J. Holmes has been appointed sales manager of the Alma Motor Truck Company, Alma, Mich., maker of Republic trucks.

John Dietrick has been placed in charge of the engineering department of the Denby Motor Truck Company, Detroit, Mich.

MACHINERY, TOOLS, EQUIPMENT AND SUPPLIES.

THE valves of the internal combustion engine require attention, and after considerable service, especially in old motors, will need refacing and reseating.



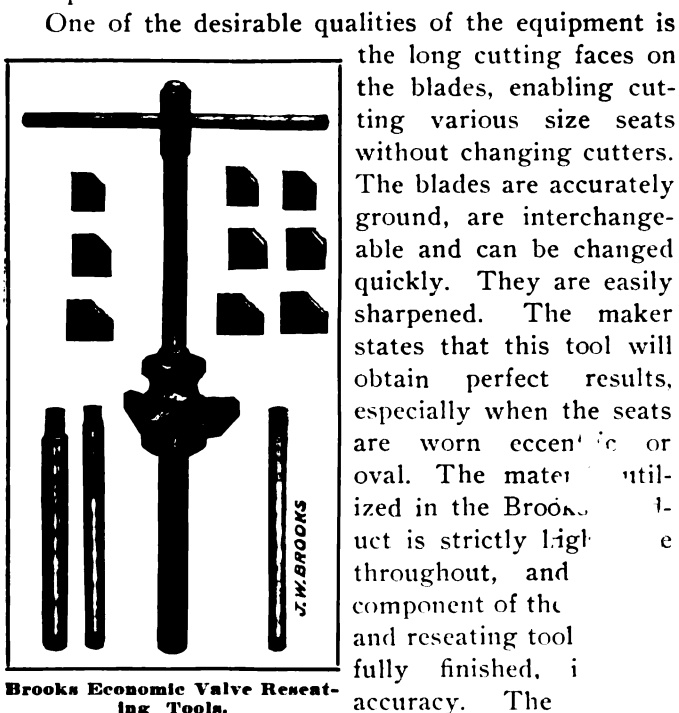
Economic Valve Refacing Tool.

Generally the work of refacing is performed in the lathe. The J. W. Brooks Company, Stamford, Conn., is manufacturing the Economic adjustable valve seating and refacing tools shown in the accompanying illustrations, and they have merits which will appeal to the expert workman as well as to those who maintain their own cars.

The refacing tool is adjustable to any size valve stem by means of bushings supplied, and it is also adjustable to any diameter of valve up to three inches. It can be secured in the vise by means of a rib cast underneath the base, or can be screwed to the bench or the wall. The tool is supplied with a double-ended cutter, one end for standard 45-degree angle valves, the other for standard 60-degree valves, and is so constructed that the valves come positively true with the stems. The maker states that 75 per cent. in time is saved with the Economic valve refacing tool.

Reseating Tool.

The reseating tool is furnished with four sets of standard 45-degree angle blades, these ranging from $\frac{1}{8}$ to $2\frac{3}{8}$ inches in diameter. Blades of other dimensions are supplied on order. Four different size pilot stems, fitting the different size valve leads, are also furnished, and these can be utilized by hand or in a drill press.



Brooks Economic Valve Reseating Tools.

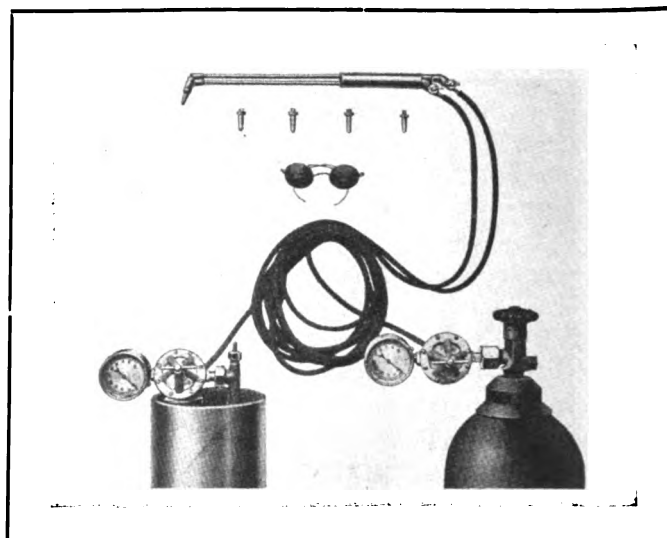
One of the desirable qualities of the equipment is the long cutting faces on the blades, enabling cutting various size seats without changing cutters. The blades are accurately ground, are interchangeable and can be changed quickly. They are easily sharpened. The maker states that this tool will obtain perfect results, especially when the seats are worn eccentric or oval. The material utilized in the Brooks product is strictly light throughout, and component of the and reseating tool fully finished, in accuracy. The

Brooks Company will supply complete details and prices of its product to the trade upon request.

WATERHOUSE WELDING OUTFIT.

A welding and decarbonizing equipment is a valuable addition to the service station or repair shop, as considerable time is saved, to say nothing of the economy effected. The Waterhouse Welding Company, Pelham street, Boston, which has been producing welding apparatus since 1907, is manufacturing a number of outfits, one of which, a moderately priced equipment, is shown herewith. This apparatus was designed especially to meet the demand for a high-grade equipment, is sold on a two weeks' trial, and is constructed with the same care and high-grade material characteristic of the products of the company.

The Waterhouse torch is stated to be constructed



Waterhouse Welding and Decarbonizing Equipment, a Scientifically Constructed Apparatus, Economically Operated.

upon an entirely different principle from any other marketed, and among the advantages claimed for it are: Better combustion, economy, wider range in the number of tips, safety and ease of operation. The principle involved is covered by patents.

The equipment includes one B welding torch with five tips, one oxygen reducing valve with 50-pound line pressure gauge, acetylene reducing valve, one set of special welding hose, one pair of welding glasses, one carbon burning torch.

REED-PRENTICE LATHE.

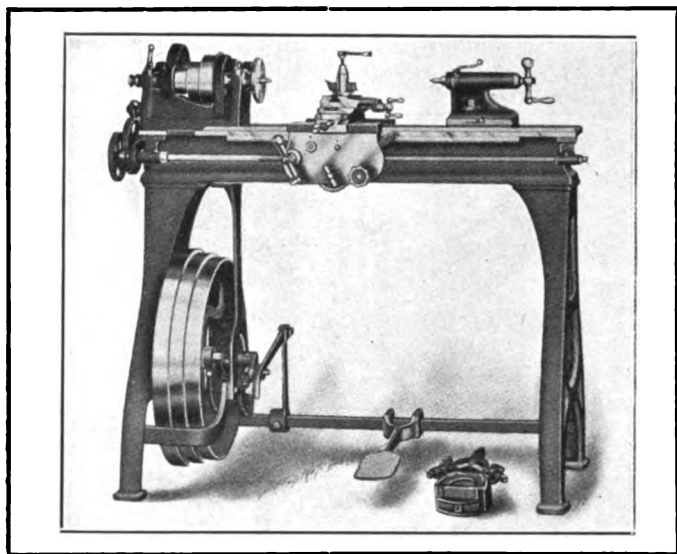
Drivers who undertake their own repairs, and small repair shops not equipped with power, generally rely on the machine shop when a bashing or similar job is required. When the shop equipment includes a lathe, considerable time is saved, to say not expense.

-Prentice Company, Worcester, Mass..

is manufacturing a 10-inch lathe which fulfills a number of requirements in motor vehicle repairing and, as may be noted by the accompanying illustration, the lathe is designed to be operated by pedal, although provision is made for driving by an overhead shaft.

One of the qualities of the machine is that the treadle slides on a square rocket shaft, and can be brought directly under the weight of the operator at any point, and secured by two set screws. The treadle and crank are so connected that, if the foot of the operator should come under the treadle while in motion, the crank is disconnected, removing all danger of accident from this cause. The foot wheel is ample in weight, is nicely turned to match the lathe cone and runs in swivel bearings.

The head of the machine is made from a crucible steel forging, and has a half-inch hole through it. The cone pulley has three steps, the largest being $5\frac{7}{8}$ inches in diameter. The width of the belt is $1\frac{1}{2}$ inches.



The Reed-Prentice 10-Inch Lathe, Particularly Adaptable to the Requirements of a Small Shop or Those Who Repair Their Own Cars.

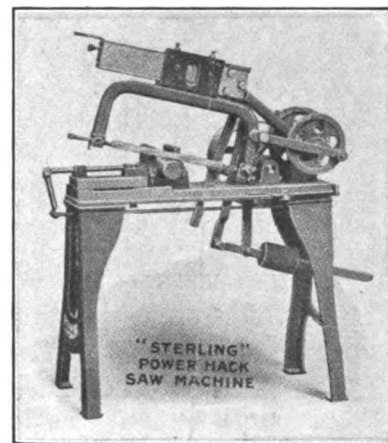
The lathe can be supplied with either compound, elevating or plain rest, and all styles have a cross feed, which is graduated to .01 inch. A taper attachment is not supplied.

The feeds are obtained from worm gearing driven by the lead screw, which is splined, to act as a feed rod, in such a manner that the only wear on the threads is when screw cutting. The apron friction is stated to be simple in construction and positive in operation, and the feeds can be instantly engaged and disengaged. The steel lead screw will cut 10 threads an inch, with open and shut nut. Gears are provided for cutting standard threads as follows: 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, 40 and 48 an inch. A metric lead screw can be supplied without extra charge, to cut $2\frac{1}{2}$ mm lead, in place of the regular screw. Gears are provided for cutting a number of metric threads. The lathe can be equipped for cutting both standard and metric threads. The countershaft has two friction pulleys, seven inches in diameter, for $1\frac{3}{4}$ -inch belt, and is driven at 200

a minute. The hangers have self-oiling boxes and the maker states that the shafts will run six months with one lubrication. The Reed-Prentice company issues a most complete catalogue showing its line of lathes, etc., which will be forwarded, with prices, upon request.

STERLING POWER HACKSAW.

The Diamond Saw & Stamping Works, Buffalo, N. Y., maker of hacksaw blades and frames, is manufacturing a variety of power hacksaw machines to meet the requirements of motor vehicle repairing. These are made under the trade name of Sterling and that shown in the accompanying illustration is the No. 1. The machine combines a number of practical features, the most noticeable of which is that it is



Sterling Power Hacksaw.

driven by milled gears, permitting use of a narrow belt. Another feature is the automatic shut-off, the saw being stopped on the backward stroke, which throws the belt from a tight to a loose pulley. Gravity feed is utilized, minimizing buckling or breaking of the saw, and the weight can be adjusted to obtain the best results on the work. The swivel vise, cutting any angle up to 45 degrees, is interchangeable.

THE PHILADELPHIA COMPRESSOR.

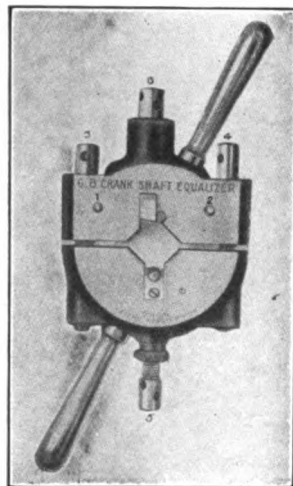
A compressor may be utilized for a number of purposes in the garage and service station, such as inflating tires, supplying forges, etc. The Philadelphia Timer & Machine Company, Philadelphia, manufactures a number of compressors, and that shown in the accompanying illustration is a single-cylinder, straight belt driven design, known as the type C. The compressor has a bore of $2\frac{1}{2}$ inches and stroke of three inches, and a capacity of 1.6 cubic feet of free air at 200 revolutions a minute. It requires one half horsepower, and is constructed for 125 lbs pressure. It is air-cooled.



Philadelphia Compressor.

G. B. CRANKSHAFT EQUALIZER.

The G. B. Sales Corporation, 1790 Broadway, New York City, is marketing the G. B. crankshaft equalizer, shown in an accompanying illustration, it being designed for truing up bearings



G. B. Crankshaft Equalizer.

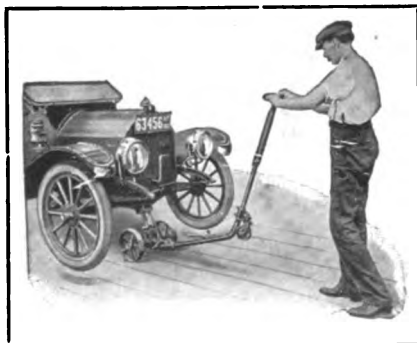
by hand. The maker states that it will true up the bearings of a crankshaft in from three to four hours and that accurate results are obtained. It is held that it eliminates the usual method of truing up bearings in a lathe, and that if one or two bearings require attention the work may be done without removing the crankshaft from the motor. This is made possible by displacing the lower half of crank case and dropping bottom half of crankarm.

The operation of the tool is best explained by the directions accompanying each member: Take out the Nos. 1 and 2 pins, pull the tool apart and attach to crankshaft, then replace the pins. Screw down the adjustment screws Nos. 3 and 4, until a light but firm contact is made with the shaft. Next adjust the steel roller by the screw No. 5 until the same touches the shaft lightly. Screw down the cutting knife by the screw No. 6 to a cutting position and turn the tool slowly and steadily.

The G. B. crankshaft equalizer is constructed of high-grade material throughout. The cutting blade is made of the finest quality of high speed, oil tempered tool steel, and it is stated that it will true up 25 shafts with one sharpening. It may be resharpened by the user, but the factory makes no charge for this work. The tool is made in two sizes, the No. 1 taking shafts from two to 3.5 inches, the No. 2 being designed for shafts from 1.5 to 2.5 inches.

AUTO-TURN JACK.

The Rub-On Manufacturing Company, Inc., 93 Brayton street, Buffalo, N. Y., is marketing the Auto-Turn jack shown in an accompanying illustration. It is constructed to make possible the use of every inch of space on the garage floor, and it is stated that with it one man can raise, turn and move a car, eliminating the necessity of a turntable or starting the motor.



The Auto-Turn Jack.

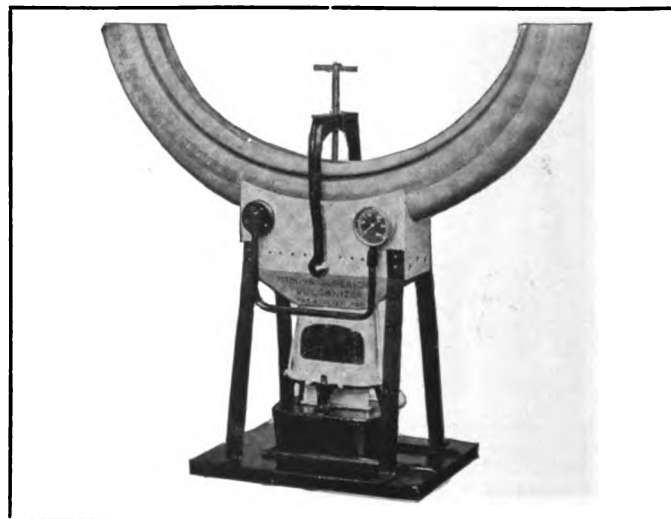
Among its qualities is its adaptability for raising

the front or rear axle when adjustments or repairs are to be made or a change of tires effected. There are a number of other useful purposes to which the jack can be put, and the maker calls attention to its time and labor saving qualities. The adjustment is instantly made to all heights of axles, and the control is simple. Complete details and prices will be supplied by the company upon request.

MAPES STEAM VULCANIZER.

The Mapes & Maburn Manufacturing Company, 19 Fulton avenue, Rochester, N. Y., is marketing a new vulcanizer, which is especially adapted for the service station, garage, etc. It is of the steam type and is adaptable to all kinds of vulcanizing from a stone bruise to a blow-out nine inches long. It can be used to repair tubes as well.

As may be noted from the accompanying illustration, the Superior steam vulcanizer is neat and compact. It is 24 inches over all, and provides a heating surface 10 inches long and six in diameter. The main



Maburn Superior Steam Vulcanizer, a Moderately Priced Equipment, Capable of a Wide Variety of Work.

casting is a combined steam boiler and a vulcanizing mold. Heat for making steam is supplied by a removable one-burner kerosene stove, which is fitted into the bottom of the main casting, resting on the base of the machine. As the flame of the lamp is controllable, an even steam pressure is obtainable. No air bags are utilized, there being substituted a bag of specially treated granulated silicon, a substance that when heated radiates the heat evenly. Each machine comes equipped with a clamp, pressure plate, two bags, a box of soapstone, cement, raw rubber, one 10-inch patch, semi-cured rubber. Complete details and price will be supplied upon request.

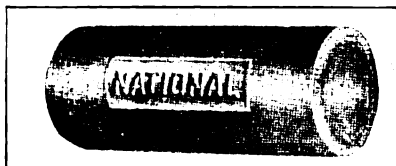
The president of Honduras has created a school of instruction for automobiles, to be known as Escuela Nacional de Automovilistas, with the object of teaching theoretically and practically the construction, working and handling of automobiles.

NEW COMMERCIAL CAR ACCESSORIES.

NATIONAL RADIATOR HOSE.

Made Especially for Circulation System of Motor Car.

One of the most common causes of a motor heating is due to impeded circulation. Rubber tubing or hose is utilized



ized to connect the radiator with the cylinders, etc., and unless constructed especially for the work the layers of fabric separate and restrict the flow of the cooling fluid. The Staybestos Manufacturing Company, Lena and Armat streets, Germantown, Philadelphia, is marketing the National radiator hose, which is guaranteed for durability and quality. The tube, cover and friction are of tested compounds, made especially to withstand the action of oil, hot or cold water, anti-freezing solutions, heat, etc. The interior of the tube is seamless and perfectly smooth. The National is made in different sizes, two and three-ply, and is guaranteed not to crack, harden, soften or collapse. The National radiator hose is made regularly in 50-foot lengths, but shorter will be furnished, in multiples of five feet, on order.

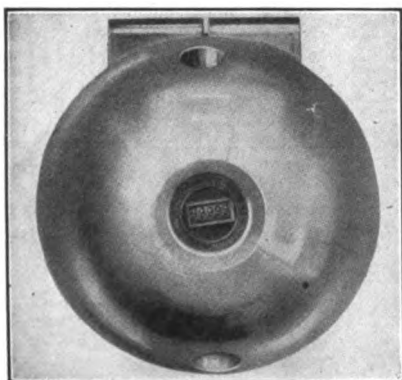
THE TRANSMETER.

Records Mileage of Car and Is Made in Several Types.

A record of the mileage of the motor vehicle is of value when having adjustments made on tires, computing operating costs, etc. The Transmitters Company, New York City, for which the American Taximeter Company, 735 Seventh avenue, New York City, is selling agent, is marketing the Transimeter, which is made for pleasure and commercial motor vehicles.

One of the qualities of the device which replaces the usual hub cap is that the recording mechanism is protected from injury by a special, substantial casing. That utilized for commercial cars is constructed to withstand severe usage.

The recording mechanism is the product of experience in counting appliances and is not affected by vibration. It registers by tenths up to 10,000 miles and repeats, and every turn of the wheel, backward or forward, is recorded. The maker states that the Transimeter can be quickly and accurately read, as the figures are always right side up and visible through a central window. Special attention is called to the coupling utilized. It is a hardened pin fitting a



hole in the axle and is pressed outward by a non-corrodible spring which automatically drops into a slotted plate.

JOHNSTONE AUTO LOCK.

Keyless Combination Type for Locking the Ignition.

The Johnstone keyless auto lock, manufactured by the Factory Sales Company, 716 Williamson building, Cleveland, O., differs from the conventional devices utilized to prevent operation of the car by others than intended in that no keys are required.

The lock is circular in shape and very compact and the maker states that being constructed of metal it cannot be destroyed in an attempt to steal the machine. The device operates on the same principle as a combination lock,

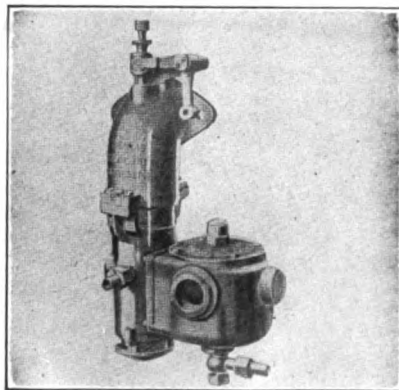


and as may be noted by the accompanying illustration is provided with a dial.

SENRAE CARBURETOR.

Uses Kerosene as a Fuel and Is of Novel Construction.

The Senrab carburetor, manufactured by the Senrab Carburetor Company, Inc., Sea Cliff, Long Island, N. Y., is constructed



to utilize kerosene and is so arranged that the adjustment of the fuel supply, primary and auxiliary air is obtained by a single member. A venturi tube is used as a passage for the main air supply. It has a central moving member carrying a tubular fuel supply with radial orifices through which the heated fuel passes under the control of a taper needle.

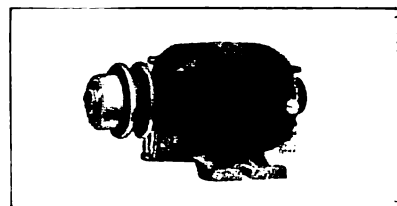
To provide for atmospheric conditions, the auxiliary valve is adjustable.

The heat of the exhaust is utilized to raise the temperature of the fuel, the gases by-passing through a jacketed float chamber, and acting upon a small quantity of the fuel in the form of a film between the heated wall of the float chamber and the float. Means for starting with gasoline are provided, and it is stated that the supply may be cut off and kerosene utilized in a very short time.

JACKSON DYNAMO.

Adaptable to Standard Cars and System Comes Complete.

The Charles A. Jackson Company, Motor Mart, Park square, Boston, is marketing an electric lighting system for



motor vehicles and motor boats. The complete outfit includes the Jackson generator, governor, automatic cut-out, ammeter and storage battery. The maker can supply brackets for mounting the dynamo on standard makes of cars and lists a special bracket for the model T Ford car, for which the system is particularly adapted.

The generator charges a battery and has an output of eight amperes at normal speed. Six-volt lamps are employed, and the maker states that the output is sufficient to meet all requirements. The dynamo is very compact, all parts are enclosed in a dust proof casing, and the gross weight is but 9½ pounds. The normal speed is 1800 revolutions a minute.

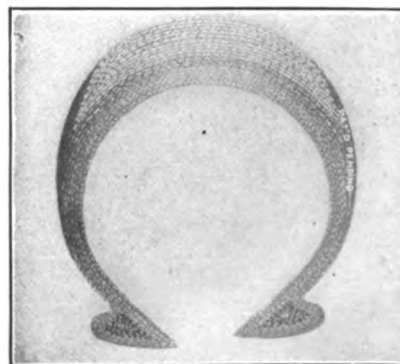
The governor utilized to control the output is a special design, and it is stated that the output may be varied instantly by turning a nut.

CANVAS TREAD TIRE.

Is Constructed of Layers of Cotton Duck and Rubber.

A tire that is stated to be puncture proof and non-skidding is the Canvas Tread, manufactured by the Canvas Tread Tire Company, Woolworth building, New York City. As may be noted by the accompanying illustration, the tread differs from conventional design in that it is of canvas, and the maker states that it is practically impossible for a nail, tack, or similar object to penetrate to the inner tube. It is also claimed that the material is so tough that blisters, stone bruises, etc., are prevented.

The surface of the tread formed by the little squares of mesh like webbing picks up sand, grit and dirt, which the maker states imbeds itself in such a way as to form a glazed surface, preventing wear as well as providing traction. It is stated that non-skidding devices are not required with the Canvas Tread shoe, which is guaranteed for 3500 miles. It is also claimed that the casing will not rim-cut, as the bead is constructed of fabric.



STEWART 1915 TRUCKS.

Machines Have Been Lightened and Simplified by Refining Design.

The Stewart Motor Corporation, Buffalo, N. Y., makes announcement that its 1915 model, 30 horsepower 1500-pound delivery wagon has been simplified in many ways. The machine has been made lighter, as there are 500 fewer parts, and through refinement and changes in the general motor and chassis design, it is claimed that 25 per cent. more mileage can be obtained for the same volume of gasoline.

The motor is a Continental four-cylinder construction with bore of $3\frac{1}{2}$ inches and stroke of five inches. The cylinders are cast en bloc and the valves are on the right side. The exhaust manifold is separate and has individual passages leading from the four cylinders. The carburetor is a Zenith and is installed on the left side of the motor, the intake passage being cored through the cylinder casting. The oiling system is a force-feed, constant-level type. A plunger pump operated by an eccentric cam on the camshaft forces the oil to the various motor parts. Ignition is supplied by a Bosch DU4-2 magneto on the valve side of the motor.

The unit power plant, with three-point suspension, is now used, this construction embracing a four-cylinder motor, inclosed disc clutch and selective type sliding gearset. Left side drive and centre control levers are continued. The frame side members have been made straight so that their strength is maximum, while the fitting of the body also is facilitated by this change. A thermo-syphon system of cooling has been substituted for pump circulation, and fuel economy and increased power are the result of water jacketing the intake manifold. A change has been made in the air cooling system. In previous models the circulation of air through the radiator, which is mounted on the dash, was produced by fan spokes in the flywheel, but a suction draft is now created by a belt-driven fan.

The clutch is a dry plate multiple-disc type contained in the flywheel, with one set of steel plates and another set of Raybestos-lined steel plates. There are nine plates in all and the surface area is 230 square inches. The gearset is a sliding type, affording three speeds forward and reverse. It is bolted directly to the bell-shaped housing that encloses the flywheel and clutch. There are two universals in the drive shaft, and the rear axle is a floating construction of Timken make with a gear ratio of $5\frac{1}{2}$:1. The front axle also is of Timken design. The steering gear is a worm and sector type which permits bringing a new quarter of the worm wheel in contact with the worm when it becomes worn. A feature of the steering mechanism is a ratchet control on the steering post to prevent slipping due to road shocks and vibrations.

Semi-elliptic springs are used front and rear, and 34 by $4\frac{1}{2}$ -inch pneumatics, fitted with Firestone quick detachable demountable rims, are standard equipment.

A glass windshield has been added to the regular equipment. Aluminum panels have displaced wood in the body construction. A Westinghouse electric starting and lighting outfit is furnished as extra equipment. All important units are quickly and easily removed.

NEW FERRO COMPANY OFFICIALS.

Following the reorganization of the Ferro Machine & Foundry Company, Cleveland, O., J. C. Gordon has been appointed factory engineer and will have complete charge of the Ferro plant. Mr. Gordon was connected with Brown & Sharpe Manufacturing Company, Providence, R. I., designing special machinery. C. W. Mason has been appointed to take charge of the marine engine promotion department, H. L. Gaddie has been made investigator of labor conditions, P. J. Patterson has been appointed a salesman in the Middle West, and H. H. White is the salesman of foundry products to the automobile industry.

COURT NAMES TERMS OF SALE.

The federal court of Ohio has issued an order in the bankruptcy case of the Sandusky Auto Parts and Motor Truck Company, Sandusky, O., giving permission to J. J. Dauch to purchase the real estate and personal property. On payment of \$35,397 and the delivery to the trustees of a \$15,000 bond, and gold notes of the par value of \$65,000, the trustee is directed to execute a deed in Dauch's favor.

The Midgley Tire & Rubber Company, Lancaster, Penn., is rushing the installation of its machinery in the former plant of the Ohio Flint Glass Company, in that city. Active manufacturing will commence within a few weeks. Harry Davis is president and Thomas Midgley vice president.

The Steel Pneumatic Tube & Tire Company, New York, N. Y., has been formed with a capital of \$200,000. John S. Heep, Frederick Fuller and C. O. Roth all of 40 Wall street, New York City, are the incorporators.

The Bennighof-Nolan Company, Evansville, N. Y., has been formed to deal in motor car supplies. Capitalization is \$100,000 and H. P. Bennighof, J. J. Nolan and V. F. Nolan are the incorporators.

The Xenia Rubber Company, Xenia, O., will locate the company's new plant in Xenia. The new building will be 50 by 100 feet.

WILLYS SEES BIG TRADE ABROAD.

John N. Willys, president of the Willys-Overland Company, who is abroad, has written to his factory in a very optimistic vein, and says that Europe's calamity is America's opportunity. "The English are not slow to see the great opportunity for trade extension given to the United States by recent events", says Mr. Willys in a cable letter.

"Sir George Parish, England's foremost financial writer, declares that the war will bring great wealth to American industries and an economic benefit to the people of the United States. He prophesies that Americans will be able to sell their crops at prices which will give them a much larger income than could possibly be realized had there been no war or danger.

"I do not believe in capitalizing the misfortunes of others. War is the greatest calamity which can befall a civilized community from a purely commercial point of view. The precipitation of hostilities has brought ruin to many Europeans, and I know that the sympathy of every true American goes out to them in this crisis. But putting aside all sentiment, I am simply stating facts that are patent to one who is in the field, and which I think should be brought to the attention of every American business man.

"The call for army reserves throughout Europe has completely demoralized the industries on this side of the Atlantic. Many of the largest automobile factories have practically been unmanned. Only a very small number of automobiles will be built in Europe until there is a cessation of hostilities and the warlike atmosphere has cleared. In the meantime, the entire field will be open to the American motor car manufacturers. There may be some difficulty in shipping cars to European ports as they may be declared contraband goods, but the rest of the civilized world will be free from European competition, and is America's for the taking. Once the people who have heretofore bought automobiles of foreign manufacture discover the superiority of American cars, Europe will never regain the field she has lost".

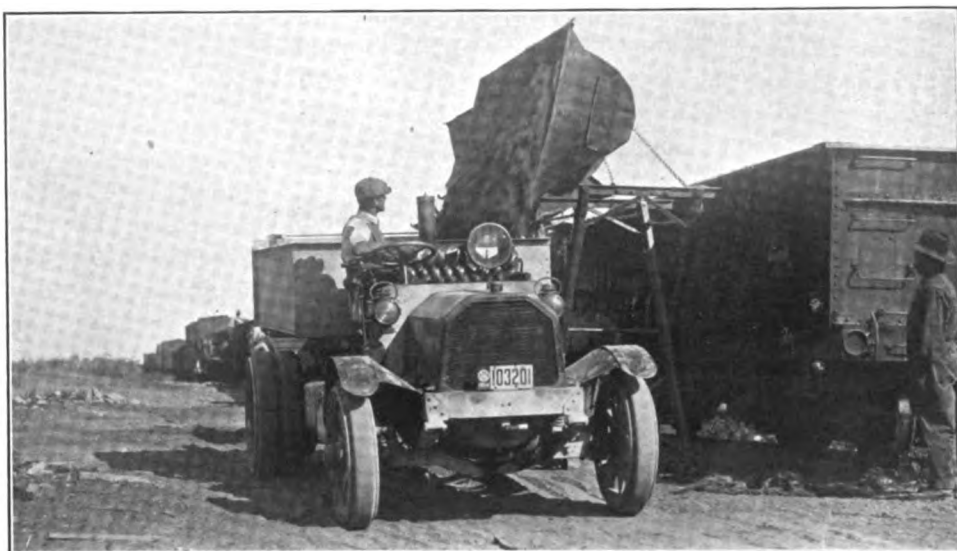
T. A. Willard, head of the Willard Storage Battery Company, Cleveland, O., recently tendered a banquet to 30 branch managers gathered from all parts of the country. The visitors spent a day at the plant.

H. C. Whitney, formerly with the R & Company, has been appointed manager of the Philadelphia branch of the Willys-Overland Company.

QUICK TRUCK LOADING.**Machines Show Large Economy When Their Time Is Practically Utilized.**

An illustration of the practical possibilities of motor trucks that are worked practically and consistently is the service of Smith & Watt, a contracting firm that is engaged in hauling sand and gravel from a siding at North Randall, O., to a reservoir now being constructed for the expansion of the Cleveland, O., water works system, about three miles distant from the railroad. A work of this magnitude requires large quantities of material and it must be supplied constantly that the workers may not be delayed, and the firm has utilized two five-ton Peerless trucks for this part of the haulage.

The gravel is brought from Earville, O., by train and is placed on the siding, where it must be unloaded



Loading a Five-Ton Peerless Truck from a Gravel Train with Lee Unloaders, Which Very Much Increases the Working Time of the Machine.

and conveyed by road to the reservoir site. The loading of the cars is done by steam shovels, but at the siding it is hand-handled, Lee unloaders being used. These are large steel pans that are mounted on frames and so shaped that they may be turned and the contents dumped into the truck bodies. The unloaders are placed close to the cars and are filled by shovellers, a comparatively small force of men being required for this work. The trucks are driven beside the unloaders and loaded by dumping the pans, and as this operation requires a very brief time, and the discharge of the loads is by gravity from elevating bodies, the machines are on the road the greater part of the time. In fact very little time is lost. Not more than two or three minutes is required for loading either truck.

The average load for a truck in this work is about four and a half yards of gravel, weighing about 2700 pounds to the cubic yard, so that a truck carries each trip about six tons, and with the round trip of 6.1 miles, and making from 10 to 11 trips a day of 10

hours, the total for the day is about 133,000 pounds. When two-horse teams are worked on the same job they haul from one and a half to two tons and make three trips a day, carrying from 4000 to 5400 pounds to a trip and about 16,200 pounds for a day. With maximum loads for the horses the trucks each do the work of eight teams, and with a team costing \$6 a day by contract the earning of the truck is large, when one understands that the operating cost is about \$12 a day.

Not only is there an insurance of an abundance of material at all times, but the saving of the trucks is large, which are two very important factors. The use of the unloaders greatly economizes time, but the equipment is serviceable for a long period and the cost cannot be figured against the one work. Or, if it is, it cannot be charged for any later work, and the saving for that will be correspondingly increased.

The new traffic rules of Washington, D. C., prohibits a vehicle, except a commercial vehicle, loading or unloading, from standing for more than 15 minutes at any place on 14th and 15th streets, between Pennsylvania avenue and I street. This is the most congested district of the Capital. The rule is effective between 8 a. m. and 6 p. m.

Alleging that traffic policemen discriminated against drivers of taxicabs, the Boston Chauffeurs' Union has voted to engage an attorney to look after their interests. According to the charges, drivers of private cars are allowed to break rules without interference, but this does not apply to taxicab drivers.

The Auto Tractor Company's new plant in Niles, Mich., is nearing completion, and machinery will be installed within the next 10 days. This concern makes a specialty of manufacturing farm tractors for attaching to all standard makes and sizes of motor cars.

The International Motor Wheel Company has been incorporated in Wilmington, Del., with a capital of \$1,000,000 to manufacture wheels for motor cars, trucks, etc. The incorporators are: H. E. Yatter, W. J. Maloney and O. J. Reichard.

The Tiffin Wagon Company, Tiffin, O., is building an entirely new system of motor car sprinklers. One of the first of the new type of apparatus will be used by the New York City fire department.

The Adrian Carburetor Company has been incorporated in Adrian, Mich., with a capital of \$50,000 to manufacture carburetors.

Plans for the refinancing of the United States Light & Heating Company, Niagara Falls, N. Y., are under way.

ACKERMAN IS RECEIVER'S MANAGER.

Judge Hazel, in the United States district court, Buffalo, N. Y., appointed James O. Moore and James A. Roberts receivers for the United States Light & Heating Company following a case in equity. The court clearly stated that there should be no interruption in the fulfillment of existing contracts or in the operations of the company.

A. H. Ackerman, vice president and general manager prior to the receivership, has been appointed general manager to operate the business because of his familiarity with it, and the entire staff of engineers, salesmen, etc., have been retained in their former capacities. Mr. Ackerman, after being appointed general manager under the receivers, issued the following statement:

"The action recently sustained in the appointment of the receivers for the property of the company was a necessary step to conserve the assets for the benefit of all. With assets of three dollars for every dollar of debt, the company is amply stable, and the court's direction to continue the business is the last proof necessary to reassure the buying public. There are already under way plans for broad financing, and, with the return of general prosperity in the country, the United States Light & Heating Company, more aggressive than ever before, intends to secure its own full share of the business and to continue the manufacture and sale of its special electrical products."

At a cost of but 10 cents for current consumed, a Waverley electric delivery wagon is stated to have been driven from Buffalo to Lockport, N. Y., and return, carrying 900 pounds on the return trip. The total running time was 3½ hours and the current used was 105 ampere-hours.

W. C. DuComb, Jr., formerly assistant engineer of the Standard Roller Bearing Company, and engineer of the Royersford Foundry & Machine Company, has been appointed mechanical engineer for Barthel & Daly, New York, N. Y., importer of Schafer ball bearings.

A bus line to carry both passengers and freight will shortly be put into service in Sorsogon Province, Philippine Islands. The backers of this project are all Filipinos. The line will run between Sorsogon, the provincial capital, and other towns in the province.

The Standard Motor Truck Company, Detroit, Mich., has issued a catalogue outlining the policy of the company, and giving illustrations and technical descriptions of the company's product.

United States Motor Truck Company has been organized in Covington, Ky., with a capitalization of \$1,000,000. R. C. Stewart, B. Bramlage and M. H. McLean are the incorporators.

FOREIGN MECHANICAL DEVELOPMENTS.

A CARBURETOR that differs from conventional practise in that no float or float chamber is utilized, and all its components are contained in a single compartment, is the Lixall, an English construction. As may be noted by the sectional view shown at Fig. 1, the chamber is practically a continuation of the intake pipe. Into the end of the pipe is screwed a cap A, forming a guide for a movable plug B, through which the fuel is introduced.

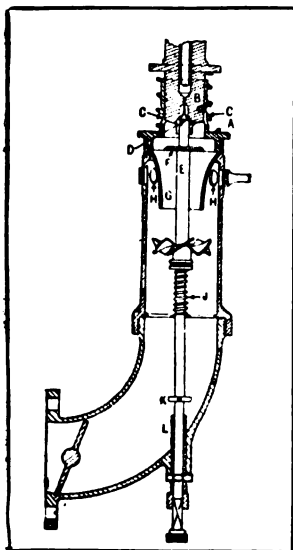


Fig. 1—The Lixall Carburetor.

Air is admitted through a ring of ports C cut in the guide, the opening of which is controlled by the position of the movable plug. The fuel outlet from the plug is closed by a needle valve D, carrying on its spindle a loose sleeve E with a disc F, against which the fuel and air impinge immediately upon entering the carburetor.

At the end of the sleeve E is a little fan, which is made to revolve by the incoming current of air and vapor, and carries with it the sleeve and disc, a ball thrust bearing being placed at the end of the sleeve to reduce friction. Just below the needle valve seating is a choke tube G, surrounded by the ring of ports H in the wall of the main chamber, these admitting the extra air and being controlled by a loose sleeve operated by a lever connected to a control convenient to the driver. The usual butterfly valve is included.

Upon the suction stroke of the engine air is drawn through the main ports C and impinges upon the disc, depressing it and also depressing the needle valve off its seat against the pressure of the spring J, and admitting fuel. The fuel spray meets the revolving disc, and is sprayed by centrifugal force against the wall of the choke tube. Extra air meets the gas at its exit from the choke tube, where mixing is assisted by the revolving fan. Towards the lower end of the needle valve is a shoulder K, which limits its downward travel by striking the adjustable sleeve L in the intake pipe. The area of the air ports, and the pressure required to depress the needle valve, can be adjusted by means of a movable plug B, so that different grades of fuel can be utilized. It is claimed that the carburetor is very economical of fuel.

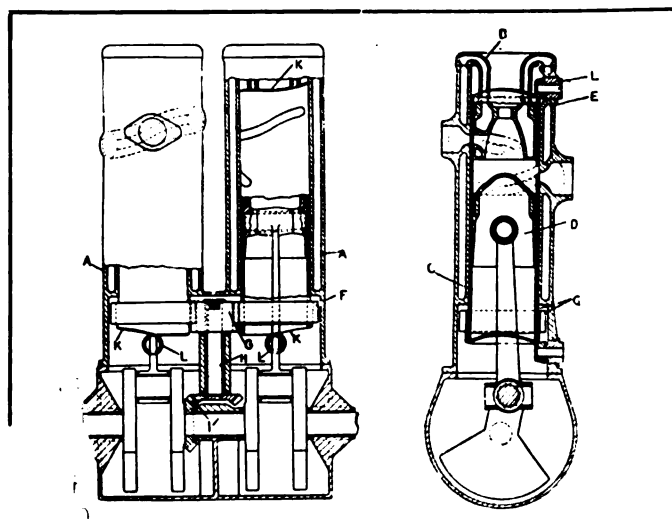
THOMAS SLEEVE VALVE ENGINE.

A sleeve valve motor of interesting design is the Thomas, invented by Captain Charles E. Thomas of London, England. The cylinders are cast in pairs,

and the intake and exhaust valves are on opposite sides, the construction being similar to the T head type. Each cylinder is provided with a water-cooled head so designed as to provide an annular space to take the upper end of the sleeve valve. Ports are formed in each side of the cylinder, and the sleeve valve is interposed between the piston and the cylinder wall and passes up between the internally projecting head and the cylinder wall to just above the gas tight rings carried by the head casting, as shown in the illustration at Fig. 2.

At the lower end of the sleeve valve is a toothed ring, which engages with a pinion on the upper end of a vertical shaft driven by a bevel gear off the crankshaft. By this means the sleeve valve can be rotated at any desired speed. But the sleeve is also given a variable vertical movement by means of cam surfaces at the top and bottom of each sleeve bearing on the anti-friction rollers shown at L. The cam surfaces on the upper and lower ends of the sleeve valves are parallel to each other and take the form of curves joined by straight lines.

An important feature claimed for the engine is that the sleeve valves and the pistons invariably and simultaneously move in the same direction in every case: that is to say, during the up stroke of the piston the sleeve valve moves upward, and during a down stroke it moves downwards. As a consequence, the movements of the pistons assist those of the sleeve valves. The shapes of the ports and cam surfaces can be arranged to rotate at one-quarter, one-half, or one-eighth crankshaft speed. If desired, each pair of sleeve valves may be adjusted to rotate in opposite directions; that is, in a four-cylinder engine the sleeve valves of the first and second cylinders can be ar-



2—Sectional Views of Thomas' Sleeve Valve Engine Having a Single Sleeve Between the Platen and Cylinder, Which is Rotated by Bevel Gearing and at the Same Time Given Vertical Movement by Cam Surfaces Engaging Rollers.

anged to rotate clockwise, while those of the third and fourth cylinders can be made to revolve anti-clockwise.

COOPER SLIDE VALVE MOTOR.

Among the more recent patents granted in England is a valve design for internal combustion engines. The principle of the Cooper invention consists in the employment of two valves similar to the slide valves used on steam engines, but semi-circular in plan, one being utilized for the intake and the other for the exhaust.

As may be noted by reference to Fig. 3, it will be seen that the cylinder has a normal piston, but the upper portion of its bore is slightly increased in diameter, and the upper part of the bore is closed by a detachable water head. This head is arranged to enter for a considerable way down the cylinder; in fact, beyond the point where the diameter of the latter is increased.

At the extreme bottom of the head is provided a junk ring to obtain a gas tight joint with the cylinder bore proper. The water jacket of the head is carried to the lowest section of the cylinder. As may be noted from the illustration, the intruding barrel portion of the head is of the same diameter as the cylinder bore

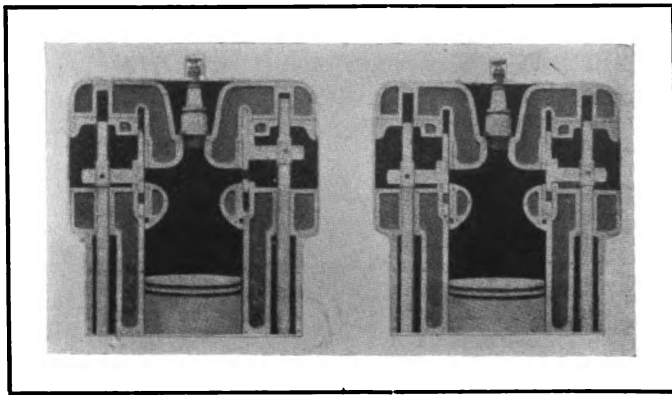


Fig. 3.—Sectional Views of Cooper Slide Valve Engine: At Left, the Piston Is Shown Ascending on the Exhaust Stroke and the Exhaust Port on the Right Hand Cylinder Is Open; at Right, the Piston Is Descending on the Impulse Stroke and Both Valves Are Closed.

so that, where the diameter of the cylinder is increased, as previously mentioned, an annular space occurs between its wall and the wall of the detachable head. This annular space serves to contain on either side a semi-circular plate of metal, extending to a point slightly less than half-way around the head, so as to make for easy access and dismantling.

The height of each of these plates is such that it can be moved upwards and downwards in the annular space, a suitable movement being imparted to each by means of a tappet rod and cam of conventional design. It will be noticed that each plate forms a kind of a slide valve. One of the features of the design is that the bottom edges of the slide valves are not open to explosion pressure, as they are entirely enclosed by the skirt of the water-cooled head.

The intruding barrel of the detachable head is pierced through its water jacket on either side to provide ports, one for the intake and the other for the exhaust. With the slide valves in their lowest position,

each port is closed, but when a slide valve is lifted a slot cut in it corresponds with the port in the head and, opposite this slot, a passage way is cast in the cylinder to form an exhaust or inlet lead, as the case may be.

Around the barrel of the detachable head a deep junk ring is fitted to spring outwards in contact with the interior face of each semi-circular slide valve, in order to form a combustion tight sliding joint. Slots have to be cut in this junk ring, of course, in order that the ports in the detachable head may not be blocked.

The operation of the mechanism is held to be simple, as each valve rises and falls in due order in a similar fashion to the poppet valve. Among the claims of the inventor is that it is possible to obtain the advantage of a sleeve valve without weight, reciprocating parts or difficulties in regard to lubrication. Furthermore, it is stated that the walls of the piston are always in contact with the water-cooled walls of the cylinders, and both the faces and ends of each slide valve are also in proximity to the water-cooled walls.

BURMA BUYING AMERICAN CARS.

During the fiscal year ended March 31, 1914, 149 automobiles, valued at \$120,350, were exported to Burma, according to Consul M. K. Moorhead, Rangoon, India. This is a big gain when compared with 57 cars, valued at \$49,740, imported the previous year.

During the past year 14 commercial motor cars were imported from the United States, valued at \$19,080. These light commercial vehicles are used by the Rangoon postoffice for delivering mail to the branch offices. They are also used by the Burma railways for its parcel deliveries and by a few of the retail stores.

PHILIPPINE MOTOR CAR IMPORTS.

The United States furnishes four-fifths in value of the total automobile imports to the Philippine Islands, and practically all the remainder comes from France. During the six months period, July-December, 1912, the value of automobiles, tires and parts imported into the islands amounted to \$542,366; during the six months, January-June, 1913, \$615,583, and during July-December, 1913, the total imports were \$647,819.

ADDS SMALL TRUCK TO ITS LINE.

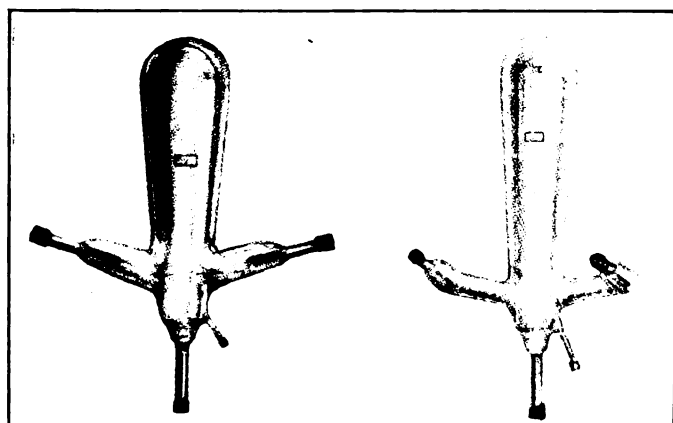
The new United States Truck Company of Covington, Ky., which has absorbed the firm with a similar name located in Cincinnati, and which has a paid-up capital of \$300,000, is to add to its product one-ton and 1½-ton trucks. The firm now makes larger trucks up to 4½ tons capacity.

ELECTRIC VEHICLE PRACTISE.

Design and Construction of Rectifier Tubes for Differing Charging Conditions and a Description of the Principles of Operation for Single and Three-Phase Panels, and the Results of Alternating Current Rectification.

By William W. Scott.

RECTIFICATION of alternating current may be by any one of several methods, but of these the mercury arc rectifier is the most generally used because of reasons that have been stated. The principles of electric current rectification are not generally



At Left a 100-Volt Mercury Arc Rectifier Tube, and at Right a 200-Volt Tube.

understood, and one must have an elemental knowledge of these to obtain from the machines the best of results in practical service. The mercury arc rectifier consists of three principal parts or elements, these being the rectifier bulb or tube, the main reactance and the panel on which the controlling and indicating instruments are mounted.

In considering these elements the statement should be made first of all that variance in capacities is governed by the proportions and design of the bulb and of the reactance, the instruments being such sizes as are necessary to meet the requirements with each type or design. Rectifiers are generally made in two types, the single-phase and the three-phase, and the choice of these is based on the character of the service that is to be obtained.

One of the most common uses of the mercury arc rectifier is charging storage batteries, and yet they are equally serviceable for a large number of purposes where necessity demands a transformation of an alternating current to a direct. The usefulness of the machine depends upon the mercury rectifier tube, which has generally the form of an elongated electric light bulb. The tube is proportionately smaller in diameter. The larger end of the bulb is the top, for the tube is maintained in an upright position in practise, and the smaller end may for the purposes of description be termed the base. At either side, near the base of the

tube, is an arm or trunnion that gradually decreases in diameter.

In each of the arms or trunnions is secured a graphite electrode that is wired to a terminal, to which a supply wire is connected. The lower end of the tube is contracted and into this is secured a wire that is connected with another terminal. Thus one will understand that in the simplest form of rectifier bulb there are three main terminals. Just above the base of the tube, usually under a trunnion, is a small tube that projects at an angle of about 50 degrees with reference to the vertical plane of the large tube, and this, too, is closed. This small tube has a wiring connection and is in every sense a terminal.

Into the rectifier tube is introduced a quantity of mercury that will fill the base and the small diagonal tube, so that while the tube is motionless, there will be two pools of mercury, yet when agitated a tiny stream of mercury will flow from the one to the other of these pools. The air is then as nearly exhausted from the rectifier tube as is possible. Any metallic or carbon conductor of electric current will heat in a vacuum (which is the principle of the construction of incandescent electric lamps), the degree of illumina-

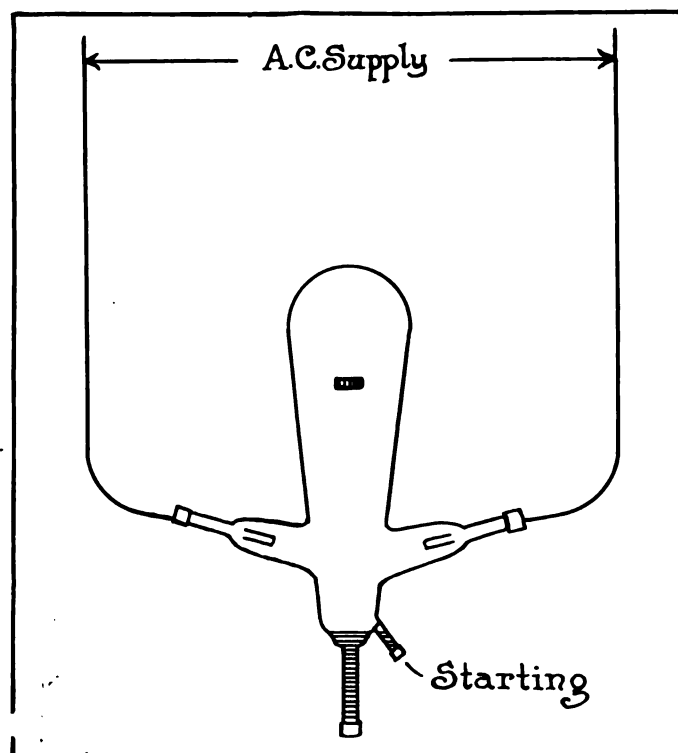


Diagram of a Single-Phase Mercury Arc Rectifier Tube.

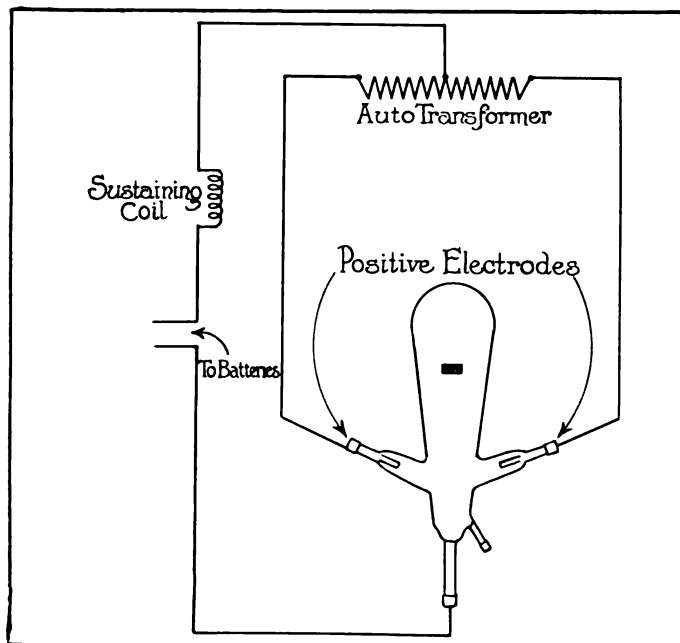


Diagram Showing the Elementary Principles of a Single-Phase Mercury Arc Rectifier.

tion depending upon the intensity of the heat.

Considering the rectifier tube for single-phase rectification: The two graphite electrodes in the arms or trunnions are the anodes or positive terminals, and the larger of the two pools of mercury in the base is the cathode or negative terminal. One will understand that the positive and the negative terminals are separated several inches, and that the spaces or gaps between them are so wide that current will not jump them, but must be conveyed by the vaporized mercury, which is ionized by the action of the electric current. In practise the mercury will vaporize, and will condense on the walls of the tube and be carried by gravity to the base and to the pools, so that during the period of rectification this process of vaporization and condensation is repeated without diminution of the volume of mercury. The shape of the rectifier tube is intended to afford sufficient cooling surface to condense the mercury vapor when formed and to drain it into the base or to the negative electrode.

One hardly needs to emphasize that the process of rectification can only continue so long as the vacuum exists in the tube, and should there be a reduction of this vacuum to such an extent as to impair the vaporization of the mercury, the current will be interrupted and cannot again be started. There will, of course, be gradual deterioration of the graphite electrode, but the process of wear is very slow. The life of a rectifier tube placed in General Electric rectifiers is guaranteed to be 300 hours, but this may be taken as a very conservative statement, for reports have been made of individual tubes which have been used from 6000 to 10,000 hours. While one could not reasonably expect the tubes to have average endurance equal to such extreme instances, these are referred to to demonstrate that very long service can be expected, and generally it proves to be much more than is guaranteed by the manufacturers.

Rectifier tubes have been developed with much care, the main purpose being to secure the highest efficiency and complete rectification, as well as the longest periods of utility.

The difference between the single and the three-phase rectifier tubes is that the latter type has a third positive electrode of graphite. With the single-phase tubes the anodes are approximately 180 degrees apart, but with the three-phase tube the positive electrodes are arranged so that there is a third terminal at approximately the same height.

In all types of mercury rectifiers there is a single negative electrode of mercury that is connected through the receiving system to the neutral of the supply circuit, and there are as many positive electrodes as there are main leads to the supply circuit. The active circuit of the rectifier is constantly being received at and through the mercury cathode from one or the other of the graphite anodes, which is, at each instant, potentially positive with reference to the mercury cathode. By this one will understand that the path through which the current is passing is automatically shifted from the one anode to the other with cyclic variation in the electromotive force. Thus with the single-phase tube the path alternates from the one cathode to the two anodes, and with the three-phase tube the path alternates from the one cathode to one of the three anodes.

With the single-phase tube a wire is connected to each of the two graphite electrodes and these are connected to the two supply leads and through an auto-transformer to the neutral wire of the supply system. The negative electrode is connected through the re-

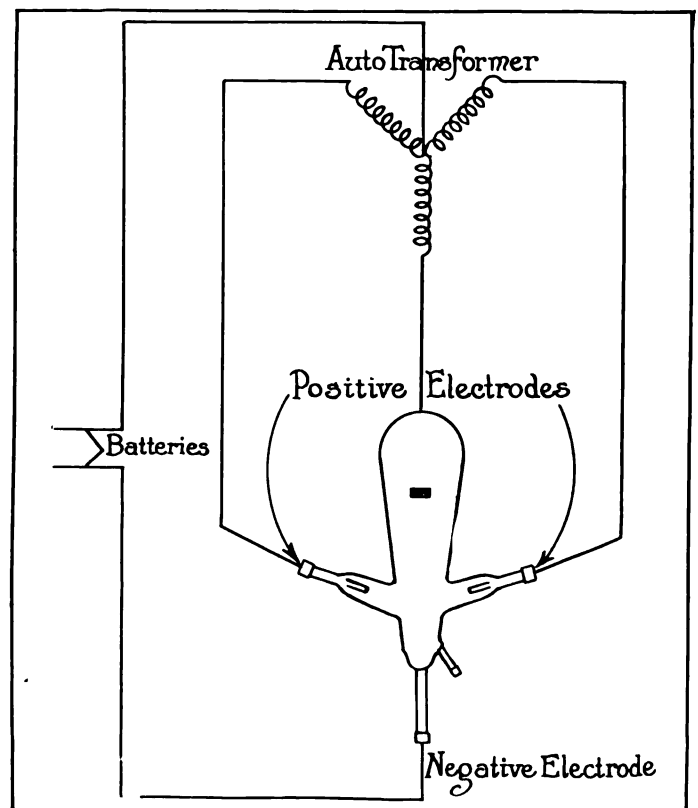


Diagram Showing the Elementary Principles of a Three-Phase Mercury Arc Rectifier.

ceiving system to the neutral wire of the supply system. This in effect gives two single-phase electromotive forces, oppositely directed, which are connected to the two positive electrodes.

That the current may not be interrupted at the conclusion of the first half cycle before the current from the other positive electrode can be begun, a sustaining coil is connected to the lead from the negative electrode (or at any location in the delivery circuit), which serves to retard the decreasing current from one positive electrode until the increasing current from the other positive electrode is of such strength that it will continue without interruption and insure the continuity of operation of the rectifier. The three-phase rectifier is with a wire from each of the positive electrodes, connected with sustaining coils through an auto-transformer to the neutral of supply current, and the negative electrode is connected with the neutral of the supply circuit through the receiving system.

The purpose of the three-phase rectifier is to have more constant continuity of current and greater certainty of operation, because when the rectifier has been started there is less probability of there being a failure of the electromotive force to move to the negative electrode from one or more of the positive electrodes.

The rectifier tube is suspended in a cradle that will protect it against jars or shocks, and it is connected with the wiring of the panel to obtain the results that are desired. Assuming the single-phase type, there are the two connections from the positive electrodes and the connection from the negative electrode, and a connection with the smaller of the two pools of mercury in the base of the tube. The function of the smaller pool of mercury is to start the rectifier, and with electrical engineers this is known as the starting anode. The connection from this anode is made through a resistance coil with one side of the alternating current circuit.

The reactance is in a general sense a coil, and the purpose is to maintain the arc in the rectifier tube while the alternating current is passing through the zero point of the cycle, or during that period when the current has decreased its movement in one direction and is beginning its movement in the other. The reactance consists of two coils connected in series and wound upon two legs of a rectangular laminated iron core, and this has three leads, one at either end of the coil and the third from the neutral point. The reactance is enclosed in a cast iron case that generally protects it. This case is usually placed on the floor below the frame that carries the rectifier panel and its instruments. The size depends upon the type of rectifier.

In the connection of the reactance the middle or neutral lead is used as the negative pole of the direct current circuit, and the positive pole is the cathode (the negative terminal) of the rectifier tube.

With reference to the principles of mercury arc rectification an elementary diagram of a rectifier tube and its connections are shown. Referring to this one

will note the following: That A and A1 are the two graphite electrodes or anodes, B is the mercury electrode or cathode, C is the small mercury electrode or starting anode, D is the connection with the neutral lead of the reactance, E and F are the sides of the reactance coil, G is the negative terminal of the transformer, H is the positive terminal of the supply transformer, and J is the battery. This is a single-phase installation.

Examination of this diagram is essential because an explanation of the operation of the current through the circuits is imperative for clear comprehension of the principles of rectification. Noting this diagram, one observes that the anodes of the rectifier tube A and A1 are connected with two sides of the alternating current supply, that the cathode B is connected with the battery and through it with the neutral of the main reactance, and the starting anode is connected with the same side of the alternating current supply as is

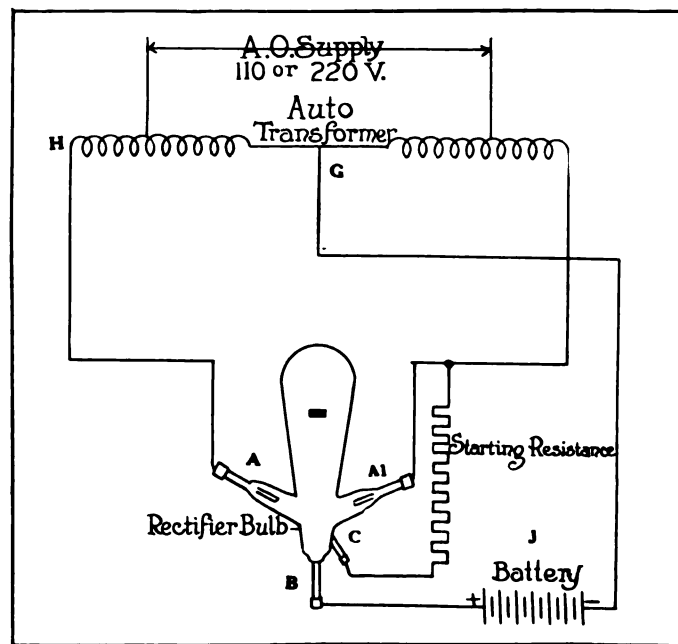


Diagram Showing the General Utilisation of a Mercury Arc Rectifier for Battery Charging.

the anode A1. The diagram represents the tube in an upright position, and at such time the cathode B and the starting anode C would be filled to the level of the glass wall between them with freely mobile mercury. This mercury, when the tube is at rest, will resist and entirely prevent the passage of a current of great strength. This condition results from what is known as negative electrode resistance, and the result is as though a film of insulating material covered the surface of the mercury.

This resistance must be overcome before the rectifier can be used, and this is done by rocking or agitating the tube so that the tiny stream or bridge of mercury between the negative electrode and the starting anode will be broken. As the mercury constantly finds its level, that in the two pools will form and break a bridge, causing a slight spark as the current is broken, and this spark will be sufficient to overcome the resistance. Following the rocking of the tube and

the formation of the spark, the tube will become luminous and some heat will be generated, this condition being caused by the vaporization of the mercury. The current will be carried by the attenuated mercury vapor from the positive electrodes to the negative electrode, and as the graphite electrodes are immersed in this vapor the current from the anodes to the cathode will pass uninterruptedly so long as is desired. This vapor is a conductor of electric energy from the positive to the negative electrode, but any interruption of the current that will cause the negative electrode resistance to re-establish itself will necessitate again starting the rectifier by the same method that has been described. This manner of starting is known as "excitation" of the rectifier.

Again referring to the diagram, one can clearly follow the movement of the current through the process of rectification. As the current alternates, first one anode (graphite electrode) and then the other becomes positive, and the current flows from these through the mercury vapor toward the cathode, and thence through the battery or whatever form the load

of the instant that the terminal H of the supply transformer is positive, by following the course of the arrows the current can be traced.

Thus, when the terminal H is positive the anode A in the left arm or trunnion of the tube becomes positive, and the current flows through the mercury vapor from the anode A to the cathode B, and thence through the battery J to the neutral connection of the main reactance D, through the right side of the main reactance coil E and thence through the right side of the alternating current supply circuit to the terminal G of the supply transformer, and through the anode A1 to the cathode B. One will note that the current at this time has not followed the supply circuit between the connection to the anode A and the connection to the left side of the main reactance F.

When the impressed electromotive force is reduced below a value that will maintain the arc against the counter electromotive force of the arc and load, the right side of the main reactance E, which has been charging, now discharges, there being no change in the direction of the current, and this discharge from

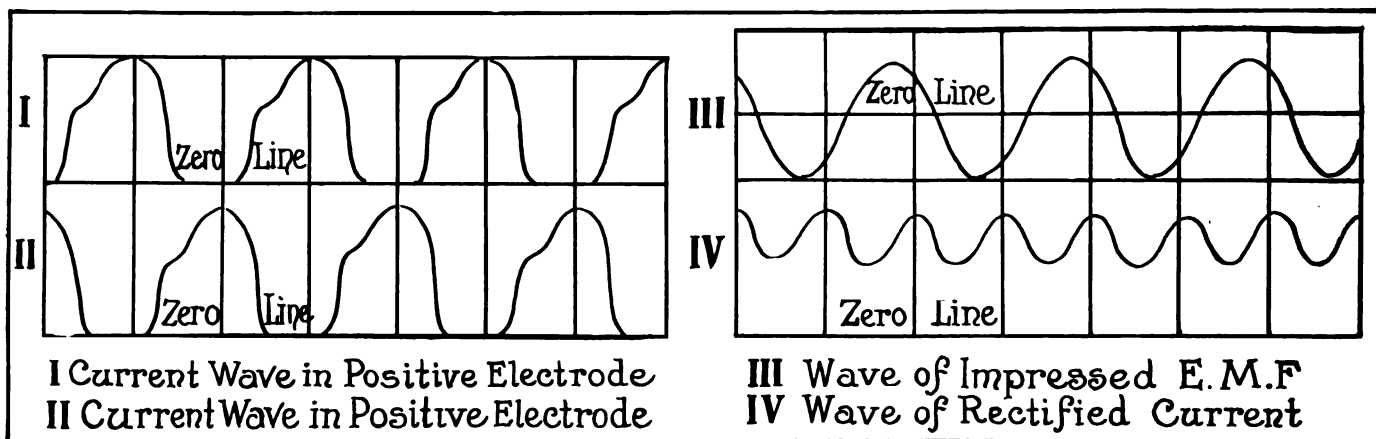


Diagram Showing the Manner of Converting an Alternating Current to a Pulsating Direct Current by Rectification.

may be, and back through one-half of the main reactance to the opposite side of the alternating current supply circuit. As the current flows through the main reactance, the reactance coils become charged, and while the value of the alternating wave of current is decreasing, reversing and increasing, the reactance coil discharges, this discharge maintaining the arc between the electrodes of the rectifier tube until the voltage reaches the value required to maintain the current against the counter electromotive force of the load, and reducing the fluctuations in the direct current. This process results in the production of a continuous current with but very little loss in the transformation from alternating to direct.

It may be well at this point to direct attention to the fact that the design of the rectifier is such that the entire alternating current is used, and this means that the rectifier has double the efficiency that would be obtained were but one-half of the alternating wave utilized. Again referring to the elemental diagram used for illustrating the movement of the current, which for the purpose of illustration is representative

the main reactance will maintain the arc in the rectifier tube until the electromotive force of the supply circuit has passed through the zero period, reversed and has been so increased that it will have sufficient potency to cause the arcing of the current between the anode A1 and the cathode B.

The discharge circuit of the right half of the main reactance coil E is through the anode A1 and the cathode B, instead of through the former circuit, and the arcing from the anode A1 to the cathode B is by current partly supplied from the transformer and partly from the right half of the main reactance coil E.

When the current that has been followed, and which caused the terminal H to be positive, has diminished to zero, the terminal G will become positive, and H will then be negative, and the current will be precisely reversed, moving through the anode A1 to the cathode B, thence through the battery J to the neutral connection of the main reactance D, charging the left side of the main reactance F, and thence through the left side of the supply circuit through the anode A to the cathode B and to the terminal H, which is then

negative. Note will be made that this circuit does not at that time flow through the right half of the main reactance coil, or between D and the connection from the supply circuit and the anode A1.

The movement of the current through the rectifier, from H as a positive terminal to G as a negative terminal, is shown by the arrows, and the movement of the current from G as a positive terminal to H as a negative terminal is shown by the arrows enclosed in circles. One must understand that the circuit is not constant through both anodes to the cathodes, but after the reversal of the current the discharge of the main reactance continues the current at either of the anodes until sufficient potency has been developed at the other, when the reactance discharge ceases. This insures a constant arc in the rectifier tube and the result is a pulsating current that may be said to move in one direction in regular waves.

For the purpose of description, the instant when the alternating current has ceased its movement, and before it has begun to develop in the opposite direction, may be referred to as the zero period or line, and for the better understanding of the reader these are shown diagrammatically. The first diagram shows the current wave at the one positive electrode and the current wave at the other positive electrode, these overlapping and supplying a continuity of current in one direction, there being some variance in strength, which accounts for the pulsations, though there is never a time when the zero line is reached. One will understand that with three positive electrodes there is greater uniformity and evenness of the current than with two.

In connection with this diagram is shown a line that represents the force of the rectified current sent out from the negative electrode, indicating its pulsations and their regularity with a single-phase rectifier, and another line that shows the regular waves of the impressed alternating electromotive force. Referring to the zero line, obviously that part of the wave below this line, if reversed, would have pulsations ranging from zero to a positive maximum, and such a current could not be maintained by a rectifier, because when the zero line was reached the negative electrode resistance of the rectifier would be established and the current would cease.

This condition has been avoided by the utilization of the sustaining coil that has been placed in the circuit, which so elongates the current waves that they overlap before the zero line has been reached. The overlapping of the rectified current waves so reduces the pulsations that a comparatively even current is produced.

To Be Continued.

A. F. Holleyhead, who was manager of the Detroit branch of the Gibney Tire Company, has been appointed district sales manager for the Federal Motor Truck Company, with headquarters at the Chicago branch of the company.

ANNUAL ELECTRIC SHOW.

Display of Cars and Trucks to Be Feature of New York Exposition.

The eighth annual Electrical Exposition and Motor Show will take place at Grand Central Palace, New York City, Oct. 7-17 inclusive, and it will be the largest and best display of the kind ever held in America. In fact, it is the only show in the world that is held annually, and the Electrical Exposition Company is a permanent organization that has for its purpose the education of the people rather than earning a definite amount of dividends.

The return from the expositions is tangible, however, in the increased utilization of electric energy for power, light, heat and innumerable other purposes by the people of New York City specifically, and of the country as a whole. While every conceivable utility is represented at this show, one of the features will be the department given over to the exploitation of electric pleasure cars and wagons and trucks for general transportation.

The policy of the management has been developed by experience. A section of the main floor will be given over to the stands at which various types of machines will be shown and explained, while the third floor of the building is largely devoted to a circular demonstrating track that is upwards of 100 yards in length, and to a model garage. On this floor a number of machines of all types will be maintained ready for demonstrating, and the garage will be departmentalized. It will include a regular storage floor, which will be equipped with the latest improved facilities for work on machines, a machine shop fitted with every desirable machine and hand tool, a battery room where all kinds of work, from assembling batteries from stock parts to repair and restoration, will be done, a charging plant, including panels, rectifiers, rheostats, etc., and a tire repairing department. These will be operated at intervals during the day and evening and the processes lectured upon.

This will afford the visitors opportunities for observing every detail of maintenance and attention, for expert workers will be busy with the machines, and all of the equipment of the department will be demonstrated by representatives of the different concerns producing it. The object is to show the practical operation of a typical garage, demonstrating methods that have been proven to be the most economical and satisfactory, and have been approved by the best of electric engineers and garage experts.

The exposition will have features that will commend it to everyone. To visit it is a liberal education for any observing person, and it will have attractions for men, women and children, no matter what their station in life or occupation. The show will be open daily from 11 in the morning until 11 in the evening.

ELECTRIC VEHICLE ASSOCIATION CONVENTION.

THE fifth annual convention of the Electric Vehicle Association of America will take place at the Hotel Bellevue-Stratford, Philadelphia, Penn., Oct. 19-21, and it will be the largest and most important gathering ever held in the interest of the electric vehicle industry. The association was organized in New York with a comparatively few interests represented in the membership, but with exceedingly energetic and broad gauge men as its executives. The scope was generally promotion of the use of electric vehicles and co-operation of members for mutual benefit. In one sense competition was thrown aside for the purpose of stimulating the entire industry and its allied interests, and this policy obtains today, which is probably the best answer that can be made to explain the remarkable growth in membership and influence of the organization.

William H. Blood, Jr., of Boston served as president for two years. The first development from an association located in New York was the organization of the New England section. Arthur Williams of the New York Edison Company succeeded Mr. Blood, and during his term of a year a Chicago section was formed. Mr. Williams was followed by Frank W. Smith, vice president of the United Light and Power Company, whose tenure of office is now drawing to a close. During Mr. Smith's administration sections have been organized at Philadelphia, Washington, Cincinnati, Los Angeles, San Francisco, Pittsburg, Detroit, Cleveland, Toronto, Denver and St. Louis, and the New York section has been developed, this taking the place of what was practically the national organization.

The association has increased more than 100 per cent. in membership during the present official year, and there is reason to believe that there will be more than 1000 members of record when the convention has convened. Not only this, the organization work has been so directed that a number of other sections will no doubt be formed within a short time, and there is reason to believe that there will be foreign branches established, although the European war will undoubtedly retard what was believed to be particularly promising development abroad.

The different sections have their own organizations, being presided over by chairmen who are ex officio vice presidents of the association, and meetings are held and the activities are conducted so as to educate business men to the value and economy of electric vehicle transportation. The work is carried on according to the needs of the differing localities in which the sections are located, each having the support of the others and the entire organization in whatever is undertaken.

The association is composed of manufacturers of electric vehicles and electric vehicle equipment and accessories, of representatives of public service, of tra-

tions, and of owners and users of electric cars, wagons and trucks. The policy of the organization is to develop interest through practical methods and by systematic education of the people as a whole to the simplicity, endurance and economy of electric machines.

At the Philadelphia convention there will be representatives from all of the sections and from localities where organization work is progressing. Besides this a general invitation has been extended to the public to attend the sessions and to learn from actual contact with the delegates the practical value of membership.

The convention will continue for three days and will include seven sessions, three on the opening day and two on each of the following days. The morning sessions will be begun at 10 o'clock, the afternoon at 2 o'clock, and the evening session at 8 o'clock. The evening of the second day there will be a dinner.

Mayor Blankenburg will welcome the convention to Philadelphia the morning of the opening day, and following the address of President Frank W. Smith will come the reports of the executive secretary and treasurer, reports from the sections, the report of the committee on constitution, and the appointment of a nominating committee.

The afternoon session will be given over to reports from these committees: Membership and formation of sections, insurance, papers, operating records, legislation, garage and rates, educational courses, standardization, traffic, good roads, central station co-operation, parcel post delivery, with papers by James H. McGraw, chairman of the parcel post committee, and by William P. Kennedy, consulting engineer. In the evening there will be papers read by J. F. Lincoln and F. Nelson Carle of the General Vehicle Company, to be followed by a report of the moving picture film committee and a display of moving pictures.

The morning session of the second day will be devoted to papers by Robert B. Grove, T. H. Schoepf and T. I. Jones, and in the afternoon the papers will be by A. A. Hime, F. C. Henderschott and W. A. Manwaring, with a lecture by Fire Chief George S. Walker. The morning session of the third day will have papers by H. S. Baldwin of the General Electric Company and George H. Kelly of the Baker Motor Vehicle Company, a symposium by electric vehicle manufacturers, the report of the nominating committee and the election of officers.

The closing session will be made specially interesting by papers by P. D. Wagoner, president of the General Electric Company, and H. P. Dodge, a lecture by Police Lieutenant William D. Mills, and addresses by Louis E. Burr and H. H. Doering.

New York City is trying to regulate traffic at Fifth avenue and 42nd street by signals with flags by the traffic police.

FIVE-TON TRUCK DOES WORK OF 16 HORSES.

In Rough Lumber Haulage It Replaces Three Four-Horse Teams and Two Wagon Crews, and Reduces the Cost of Work from \$8321.80 to \$2796.10 Annually.

THE efficiency and economy of the motor truck for hauling heavy loads in rough conditions and its vast superiority over the horses it replaced are strikingly demonstrated in the results obtained

of this motor truck used by Henry Girard, a dealer in railroad ties and lumber at Lafayette, R. I.

This truck was made by the Woodworth Motor Truck Company, Providence, R. I. It was purchased

Sept. 1, 1912, and cost, with extra steel tires, \$4800. Immediately after purchasing the truck, Mr. Girard disposed of three four-horse teams, which originally cost \$4500. Consequently, the truck was called upon to take up the work of three teams and four horses. How the truck met this expectation is proved by figures furnished by Mr. Girard.

Taking first the hauling capacity of the truck as compared with that of the teams, it is shown that the former replaces between 12 and 16 horses on all haulage work. Formerly 16 horses were required to haul 16 cords of wood a distance of eight miles daily, whereas the truck now carries exactly the same amount at

greatly reduced expense. On a 10-mile trip the truck carries 320 railroad ties daily, compared with 15 horses that were previously required to transport the same number daily.

In the case of the teams, usually a five-hour haul was considered a day's work, and Mr. Girard states that this was the average amount of work done by his horses. In contrast with this the truck is run 12 hours every day. During January, February, March and April of this year, with a double shift of men, the machine was used the full 24 hours every day. From



Three-Quarter View of Five-Ton Woodworth Truck, Owned by Henry Girard of Lafayette, R. I., Which Has Replaced Three Four-Horse Teams.

from the use of a five-ton truck in the haulage of railroad ties and lumber in a section of rural Rhode Island. Continuous use for long periods in very unfavorable conditions have furnished a severe test of stability and reliability, in which the machine met all requirements in a manner that more than fulfilled the expectations of the owner.

To replace three four-horse teams, accomplish the work previously requiring 16 horses, and cut the annual upkeep expense from \$8321.80 for the horses to \$2796.10 for the motor driven machines, is the record



To the Left Is Seen a Huge Pile of Sawdust, All That Is Left of a Small Load After Five Weeks of Sawing, and to the Right Is an Example of Road Conditions, Despite Which a Woodworth Truck

Has Remained Effective, Logs Being Used to Fill the Ruts.



March 9 to April 24 the truck made three round trips each day and three at night between Wickford and Carolina, R. I., a distance of 13 miles in each direction. The average mileage made by the truck during this busy period was between 120 and 160 miles per day. The average that is maintained daily on the 12-hour basis is between 60 and 80.

During January, February and March Mr. Girard used his steel tires for most of his work. These tires are 48 inches in diameter, eight inches wide and $1\frac{1}{8}$ inches thick. These are only good for use on frozen ground, and when the earth becomes wet or sandy, the rubber tires, which are Goodyear 42x6 blocks, are replaced.

Mr. Girard's machine recently underwent a severe test of efficiency for five weeks at East Greenwich, R. I. Mr. Girard's men had been sawing up and hauling away the trees of a small forest. The truck made seven trips every day to a point in East Greenwich, six miles from the field of operations, carrying an average of 3000 feet to the load. In five weeks it carried a total of 630,000 feet of timber in 210 trips. As much as 4532 feet of surveyed lumber has been carried a distance of 29 miles.

In the accompanying photograph is shown a sample of the roads that were traversed during the five weeks re-

ferred to. It was necessary to throw logs and boards in various ruts to fill them. To the right of this picture is seen all that is left of the "forest".

In addition to the regular work of this kind, the truck first transported the machinery, tool houses, boilers and all other necessary implements to the scene of operations. In this way it has carried eight tons and dragged a boiler and engine weighing 11 tons a distance of 42 miles.

Mr. Girard's experience gives a fairly complete idea of the hauling capacity of the

truck, and may go a long way towards explaining his remark that he is replacing hay and straw with gasoline. But the cost must be considered. Does the expense warrant it?

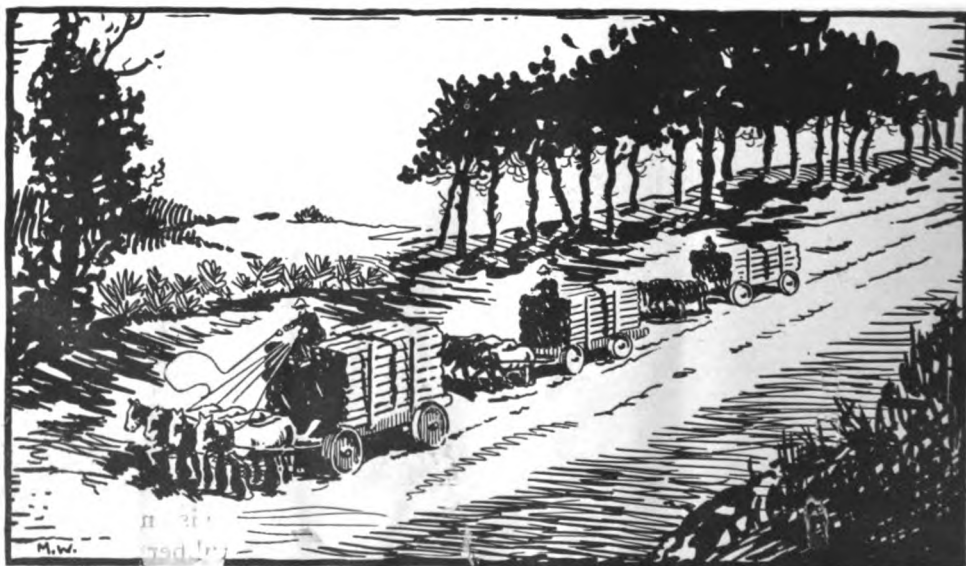
Consider the figures of the truck owner on the expense involved and observe the result: A four-horse team harnessed costs \$1500. As stated above the Woodworth truck replaced three of these teams. This

gives a fair comparison of first cost at the start, a total of \$4500 for three complete teams as against \$4800 for a fully equipped truck. The wage paid a driver of a four-horse team is \$15 per week, and his helper receives \$12 per week. The truck driver receives

the same wages as the horse driver, and his helper gets \$10.50. However, it must be remembered that three drivers and three helpers are needed for

TRUCK	
Original Cost	
One 5-Ton Truck	\$4,800.00
Annual Upkeep Cost	
Wages of Driver	\$780.00
Wages of Helper	546.00
Insurance	106.00
Gasoline	873.60
Oil	109.20
Tires	261.30
Extra Parts and Repairs	120.00
Total	\$2,796.10

TEAMS	
Original Cost	
Three Four-Ton Teams	\$4,500
Annual Upkeep Cost	
Wages of Three Drivers	\$2,340
Wages of Three Helpers	1,872
Death of Horses	600
Shoeing and Wagon Repairs	124
Feed	3,076
Veterinary and Medicine	300
Total	\$8,312



the three teams, who are replaced by the one driver and one helper for the truck. The saving in help alone appears thus: The annual salary of three drivers for

line. This is a total of \$982.80 for truck "feed" compared with \$3822 for feed for the 12 horses it replaced.

An equally significant comparison may be drawn

between the items of repairs and replacing parts for the truck and shoeing and wagon repairs for the horses and teams. Taking the average for the two years, it is seen that the truck cost \$120 a year and the teams \$124 for these items. This fig-

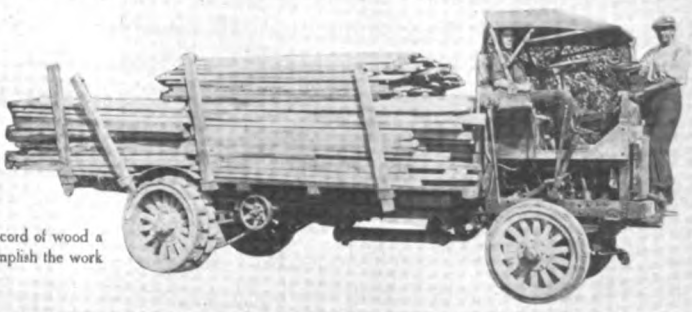
Five-Ton Truck Replaces 15 Horses Hauling Railroad Ties

Truck carries 320 ties a day on a 10-mile haul.

Fifteen horses were formerly required to carry the same number.

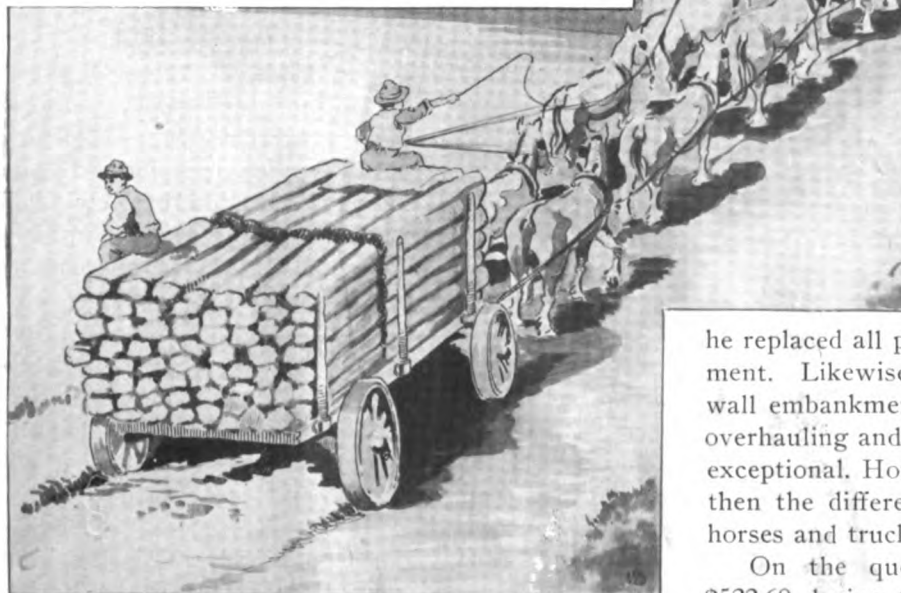
Truck hauls 16 cords of wood a day on an eight-mile trip.

One pair of horses average one cord of wood a day, requiring 16 horses to accomplish the work of this one truck.



as many teams is \$2340, and the helpers receive \$1872. Contrast this with the \$780 received by the one truck driver and \$546 by the helper and the saving in this respect is realized.

Another big saving is in cost of fuel compared to expense for feed of horses. This item includes hay, grain, etc., for the horses, and gasoline and oil for the truck. Each horse eats $87\frac{1}{2}$ cents worth of feed daily. This amounts to $\$6.12\frac{1}{2}$ per week, and more than \$318.50 per year. It must be remembered that horses eat seven days a week. Consequently, 12 horses eat just 12 times as much, which amounts to \$3822 spent annually for feed. Once more we compare this with the truck expense and note the result. For the two-year period Mr. Girard has had his truck it has consumed an average of one gallon of oil and 20 gallons of gasoline daily. Oil has cost him an average of 35 cents per gallon and while gasoline has been as low as 10 cents per gallon and as high as 16 cents, the average has been 14 cents for the two years. Consequently, taking these costs



ure for the truck, however, is excessive and may easily be explained. First, when Mr. Girard found that the Woodworth company had gone out of business he feared that it would be only a question of a little while before he would be unable to get parts for his truck. As a result

he replaced all possible parts with standardized equipment. Likewise, his truck was driven over a 10-foot wall embankment onto rocks. This caused extensive overhauling and many repairs, but this, of course, was exceptional. However, it has been figured in and even then the difference in cost of repairs between the horses and truck is \$4 in favor of the latter.

On the question of tires, Mr. Girard has spent \$522.60 during the two years he has had his truck. There is a excessive charge of \$90 due to the fact that the front wheel was torn away from the base of the front

for six days a week, this gives a total of \$109.20 per year for oil and \$873.60 for gaso-

wheel when the machine took its 10-foot plunge. There has been an incidental expense of \$32.60 for the changing and setting of the steel tires.

Insurance costs \$106 annually, and this covers fire, theft, damage, liability, etc. There was no insurance carried on the horses, but there was a \$2000 policy on the barn and its contents, exclusive of horses. However, for the sake of doing justice to the 12 horses replaced, the item of insurance has been eliminated entirely in this instance, but figured on the truck.

The only two items remaining for the horses are death and veterinary expense. In the case of the former, Mr. Girard says that during the past 10 years he has lost on an average two horses a year out of 35, and charged off a loss of \$300 a piece. This places the annual cost by death of horses at \$600, and as it extends over a 10-year period, it may be considered a fair estimate. Veterinary attendance and medicine cost him on the average \$300 a year, the doctor making on the average one visit a week for the 12 horses. His services costs \$5 per week and medicine brings the total up to the amount stated above.

Mr. Girard did not allow for depreciation for the teams, but when he bought his truck he figured that it would last three years in his rough work. In order to be on the safe side he allowed 33 per cent. annually for depreciation, or \$1600 a year. To date he has \$3200 set aside and next year he will have the original outlay back, and a truck that is as good as new; in fact better, because it now carries standardized equipment. This amount has been deducted from the amount of the truck's earnings, but it would not be a fair comparison to make the allowance for maintenance, inasmuch as there would be no corresponding item for the teams.

This concludes the cost of maintenance for both truck and teams, and from the summary given in the circles, printed herewith, the results of the analysis may be seen at a glance.

This Woodworth truck has a Wisconsin motor of four cylinders, cast in pairs, with a stroke of $5\frac{1}{2}$ inches and a bore of seven inches. The lubrication is by splash and pump and the carburetor is gravity fed. Among the standardized parts with which Mr. Girard has equipped his machine are: Eisemann automatic advance magneto, Kingston $1\frac{1}{2}$ -inch carburetor, 10-ton Warner transmission and differential, Timken axle and bearings and a Merchant & Evans universal clutch.

Asked how the truck stood up as a paying proposition, Mr. Girard said: "During the month of June my truck netted me \$605 above all expenses and during July it cleared \$655. I have not figured up the August results as yet, but I will have a small outlay to make for new tire blocks. Of the \$522.60 I have for tires in the past two years, \$403 was paid out in one lump sum for rear block tires. They are just half worn out at the present time.

"One of the biggest factors I find in using a motor truck is the class of men secured. In using teams

occasionally one is compelled to hire a man and entrust him with a four-horse team, costing \$1500. Ordinarily you would not, and could not, trust this same man with a \$5 bill, but you place \$1500 in his hands every day. However, with the motor truck I find we required a much higher grade of men in every respect, men who have knowledge as well as integrity. This alone is worth something", he concluded.

REPLACES STEAMER AND CHEMICAL.

The American-La France Fire Engine Company of Elmira, N. Y., is building three gasoline combination trucks for the Worcester, Mass., fire department. The first of these trucks is a combination pumping engine, hose wagon and chemical engine, and represents the most modern type of fire fighting apparatus. It will replace both a combination chemical and hose wagon and a big steam pumping engine, and will also reduce the number of men required on the engine. This will be done by making the motor of the truck run the engine, thus doing away with the driver and the engineer of the ordinary type of pumping apparatus. The machine is equipped with a 35-gallon chemical tank and 1000 feet of hose.

ITALIAN AUTOMOBILE COMMERCE.

During 1913 the imports of automobiles into Italy increased by 17 per cent., whereas the exports from Italy decreased seven per cent. For the first time since the beginning of the automobile industry in Italy there has been a decrease in the number and value of cars exported. With an exportation of 3223 vehicles, valued at 34,000,000 lire, Italy still surpassed by about 3,000,000 lire and 300 cars the 1911 figures.

A. I. Butler, formerly manager of the branch of the Goodyear Tire & Rubber Company, Brooklyn, N. Y., is associated with the Batavia Rubber Company of New York, in the capacity of special representative in northern New York territory.

A. F. Masury, formerly service manager of the International Motor Company's station in New York City, has been made chief engineer of the company. A. H. Leipert, superintendent of service, succeeds to the former duties of Mr. Masury.

The Dart Company, Waterloo, Ia., has been re-organized as the Dart Motor Truck Company. Preferred stock to the amount of the assets of the old company is to be sold, and \$85,000 will be paid in addition as capitalization.

Murray M. Harris of Los Angeles, Cal., has been made president and general manager of the Pacific Coach Company of San Francisco, Cal. He had been vice president since its organization.

MOTOR TRUCK CONVENTION AT DETROIT.

MOTOR truck manufacturers, dealers, owners and those engaged in studying transportation by highway vehicle are deeply interested in the national convention of these interests that is to take place at Detroit, Mich., Oct. 7-10, organized by the Motor Truck Club of America, which has the co-operation of the Detroit Chamber of Commerce and, through that association, numerous other highly influential bodies.

The convention will be the first gathering of this kind ever held in America. The purpose of the organizers is to bring into the meetings representatives of interests that can logically be identified with the general purpose, and which would, were the convention restricted to one element, be necessarily limited as to number.

The Motor Truck Club of America is practically the only association that is engaged in generally promotive work outside of the direct industrial and trade organizations. The majority of its members are located in New York and vicinity, but its membership is increasing rapidly and, being representatives from the industry, the trade and the owners of machines, endeavor is made to stimulate the general utilization of motor vehicles.

The club has gone into widely varying subjects and brought about the co-operation of interests that would not have been secured by strict industrial organizations, and it has dealt with phases of transportation that have not been investigated nor given serious consideration by other bodies. In this respect it has a unique standing with relation to the industry, for through it highway transportation economy has been taken up by municipal and state administration, as well as by various civic bodies that have as objects the general welfare of the people.

In organizing the convention no one interest has been considered. The main purpose has been to bring to the attention of every person practical reasons why the motor wagon and truck should be utilized, and obtaining the influence of those who have had demonstrated a material reason why they will directly benefit by the change from animal to motor transports. By this is meant that while the convention is in a general sense devoted to manufacturers, the trade and the owners, it will have large value to municipal and civic bodies from the fact that co-operation with them will be advocated to the end that there will be realization of benefits that are intensely practical, but are often neglected or are even unknown.

The plans for the convention have been outlined, but while some of the details will stand as tentatively arranged, there is probability of numerous changes. The papers, however, will deal with practically every condition of production, distribution or operation that might be conjectured, with principles and policies, and will include suggestions that may be acted upon according to the will of the convention. In addition to

the list of speakers, the intention is to present from time to time subjects that can be discussed at length.

The opening session will take place in the convention hall of the Hotel Cadillac the afternoon of Oct. 7, beginning at 2:30, and among the papers will be those on "Time Payment Plan for Selling Trucks", "Territorial Lines for Dealers", "Evils of Overloading and Overrating", and "Advertising—Relationship Between Factory and Dealer". In the evening a Dutch lunch with cabaret will be an attraction, the delegates to be the guests of the Detroit committee. The opening session of the second day the papers will be on "List Prices: Discounts for Quantity Business, Discounts on Parts and Amounts of Parts to Be Carried", "Traffic and Transportation Engineering", "Uses of Motor Trucks on Farms", "Deposits on Sales" and "Advertising Campaigns in Relation to Distributors' Territory". The papers for the afternoon session will be "Importance of Dealers Selling at List Prices", "Factory Sales Assistance to Dealers" and "Tire Guarantee and Mileage". The delegates will be the guests of the Detroit committee at a theatre party in the evening.

The morning session of the third day will consider "Manufacturers' Guarantee and Service to Owners" under these headings: What Is Service? Free Service. Replacement of Parts. Inspection. Garaging. Educating Drivers. Assisting Owners. Stocks and Parts. Furnishing Spare Trucks When Repairing Others. Price on Labor for Replacement of Parts Under Factory Guarantee. The papers will be "The Trading Evil", "Central Market Report on Trucks", and "Demonstrations—Necessity and Charges". The afternoon programme will be devoted to papers on "Prices for Labor in Different Cities", "Drivers' Relation to Successful Motor Truck Operation", "How to Calculate Maintenance Cost", "Loading and Unloading Devices to Save Time" and "Contract Delivery Work". In the evening a banquet will take place.

The morning of the last day will be devoted to the completion of unfinished topics, the consideration of annual shows, future conventions, permanent organization, etc. A number of subjects have been suggested for discussion in addition to those enumerated.

The Clayton bill, just passed by the United States Senate, contains the so-called Walsh amendment, which was substituted for the House measure relating to un- trade practises. The new measure is designed to prevent the patent monopoly, which the supreme is supposed to have recognized in the Dick neograph case.

The New Jersey Motor 'Bus Company, Paterson, N. J. has been incorporated with capital of \$50,000. The incorporators are: Louis Cramer, Sr., Louis Cramer, Jr., and John Purce, all of Paterson, N. J.

INDUSTRY'S GREAT VITALITY.

Business Shows Material Increase for August Despite the European War.

The stability of the automobile business has been forcibly illustrated in the last few weeks by the remarkable vitality that the industry has exhibited under stress of the shock produced by the sudden plunge of Europe into war. Following the outbreak of hostilities early in August, for two weeks the industry suffered an almost complete shutdown. The uncertainty of the outlook caused momentary apprehension, but so short lived was this that a reaction set in almost immediately, which is still being felt and which placed the volume of business not simply where it was before the war broke out, but far ahead of last year's record.

An optimistic feeling that the fall business in automobiles would be almost as good as had been expected, despite the many discouraging factors that have beset the industry in common with others of late, was apparent at the meeting of the directors of the National Automobile Chamber of Commerce, which was held in New York on Sept. 1. The many manufacturers of automobiles who were present, representing the 93 members of the chamber, viewed with great satisfaction the figures presented by the traffic department, which showed that the number of car loads of products shipped by the makers during August were within one of 2400 more than the number of car loads shipped in August of 1913, which was 4469.

After deciding to postpone as inopportune the holding of a convention of commercial vehicle manufacturers, the directors of the chamber listened to a comprehensive report from the committee on patents, with regard to the automobile patent situation and the proposed changes in the patent laws. Present laws, it was felt, while not all that could be desired, are not to be changed without serious consideration.

Emphatic condemnation of the action of certain accessory manufacturers in extending to the maker and the owner of automobiles the controversies between themselves over patent rights was voiced by the men at the meeting and a strong resolution was adopted in which the bringing of suits by such makers of parts and accessories against the manufacturer, vendor or user of a motor car was characterized as unwarranted, unfriendly and against the best interests of the industry. Notice of the view of the chamber on this matter will be sent all makers of accessories.

The resolution is as follows:

Whereas members of the National Automobile Chamber of Commerce have been annoyed and embarrassed by patent infringement and by patent infringement against them or against their customers and cars by certain manufacturers of automobile parts; and

Whereas it is unnecessary for such manufacturers and parts to bring suits against automobile makers, vendors and users of motor cars in order to protect their rights under their patents, inasmuch as such makers of accessories and parts have ample recourse against manufacturers of such accessories and parts

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Therefore, be it resolved that the directors of the National Automobile Chamber of Commerce regard any such suits by accessory and parts manufacturers against motor car manufacturers, vendors or users of motor cars as being unwarranted, unfriendly and against the best interests of the industry; and be it further resolved that the Motor and Accessory Manufacturers Association be advised of the attitude of this chamber on this subject with the end in view of giving all manufacturers of accessories and parts due notice of the attitude and feeling of the National Automobile Chamber of Commerce.

POPE COMPANY TO PAY DIVIDEND.

Col. George Pope, receiver of the Pope Manufacturing Company, has been authorized by Judge Tuttle of the superior court of Hartford county, Connecticut, to pay a dividend of 10 per cent. on the allowed claims, which approximate \$1,600,000. The United States court at Boston has allowed claims to the amount of \$1,641,382, which include the claims of the stockholders. A master is to consider claims for \$157,365, which include one of Albert L. Pope for \$44,537, one of Charles E. Walker for \$30,153, and one of Wilbur C. Walker for \$26,802. The Westfield, Mass., plant is offered for sale, but no offer has as yet been received.

NEW YORK'S REGISTRATION.

To Sept. 14, 161,353 motor vehicles of all kinds had been registered in the office of the secretary of state of New York State, which was an increase of 36,090 over the number registered during the corresponding period of 1913, and the total amount paid the state in fees was \$1,462,963.86. Licenses have been issued to 61,398 drivers. In 1913, 132,450 vehicles were registered and 56,702 drivers were licensed.

ANOTHER DENBY TRUCK.

The Denby Motor Truck Company, Detroit, Mich., which a short time since began the manufacture of a 3000-pound delivery wagon, has announced that it will build a 2000-pound wagon which will be practically the same in general design as the larger machine, save that it will be equipped with lighter springs. There will be a slight difference in price.

A quarterly dividend of $1\frac{1}{2}$ per cent. on the six per cent. preferred stock and of $1\frac{3}{4}$ on the seven per cent. second preferred stock, payable Oct. 1 to stockholders of record of Sept. 15, has been declared by the Kelly-Springfield Tire Company.

The Longuemare Carburetor Company has been incorporated with capital of \$100,000 by W. J. Mahoney and O. J. Reichard, both of Wilmington, Del. The purpose of the company is stated to be the manufacture of carburetors.

Quarterly dividends of $1\frac{3}{4}$ per cent. on its preferred stock and two per cent. on its common stock, payable Sept. 16 to stockholders of record Sept. 12, has been declared by the Rubber Goods Company.

THE PIERCE-ARROW FIVE-TON TRUCK.

FIVE years, from the completion of the original machine to the production of the first vehicle offered for sale commercially, were given over to the development of the Pierce-Arrow five-ton truck. The design for the initial truck was very carefully constructed. When ready for experimental work the company ran it for a period and then transferred it to the service of a tire company that used it for 18 months. It was after this used by two breweries, a transportation company, a manufacturing company and other concerns.

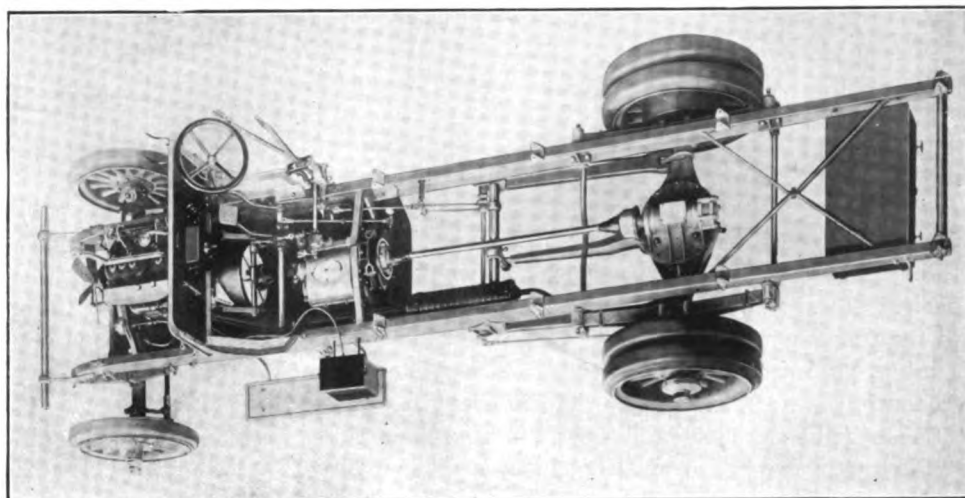
The truck was operated in all very widely differing working conditions, for long and short hauls, on practically every sort of highway, and the greater part of the time was not used or maintained by experts. The service of the truck was very carefully observed. Varying changes were made where experience demonstrated these were necessary. The experience with chains and sprockets was such that the company sought what would be, in the judgment of its engineers, simpler, more enduring and more economical. This led to investigation in Europe, and when the conclusion was reached that shaft drive with a worm and worm wheel would afford the results sought, the company added to its organization men who had experience in building and operating this form of gearing in heavy motor vehicles.

The worm and worm wheel drive was not a new construction, for this system had been used for several years with great success by a number of English motor truck and passenger car builders, but it was radical with American automobile manufacturers. A long period was devoted to comparative operation of two trucks, one chain and the other worm and worm wheel driven. This test developed the machine as now sold, for the design was standardized, it being regarded as having the Pierce-Arrow standard of quality. The statement is made that rightly designed worm gears will afford the highest known mechanical efficiency for speed reduction gears, and that with carefully designed worms and fine workmanship an efficiency of 95 per cent. can be obtained with any reduction from $2\frac{1}{2}:1$ to $16:1$.

The adoption of the worm and worm wheel drive necessitated the use of a full floating type of rear axle—a housing enclosing the worm, worm wheel, differential assembly and driving shafts, with the wheels revolving on large roller bearings on the ends of the

housing—which affords a very large margin of safety, insures abundant lubrication and extreme efficiency. With this construction the axle housing carries all the load and the driving shafts are relieved of all torsional strains. This axle is specially built and designed to meet Pierce-Arrow requirements.

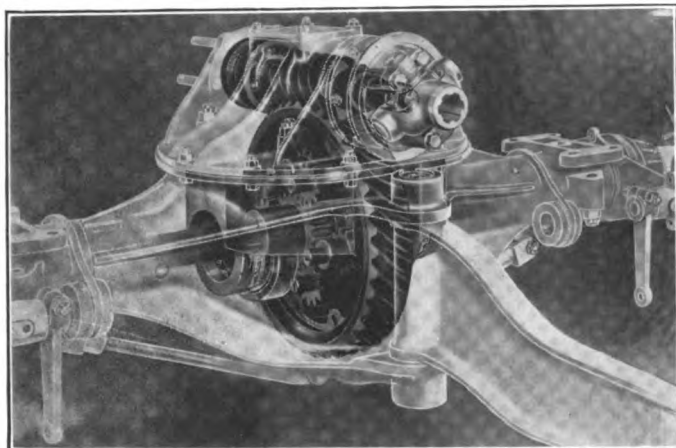
The well designed full floating axle is as strong and rigid and free from trouble as the dead axle, and the Pierce-Arrow unit is made heavier than are those used by European motor vehicle manufacturers because of the conditions of American highways. The centre case is a very rigid webbed steel casting that has a large opening on the top that, when the axle is assembled, is closed by the plate that carries the worm, worm wheel and differential. There is a heavy boss at either end of this casting, into which are shrunk and riveted, steel tubes that form the ends of the axle. Cast steel sleeves are carried on the outer ends of the



The Stripped Chassis of the Pierce-Arrow Five-Ton Truck, Specially Showing the Gearset and the Driving System and Rear Axle.

housing that carry the supports for the rear wheel brake shoes. The inner ends of the sleeves are formed to engage with bosses on the central steel casting, so that the braking strains are taken by this portion of the axle, and these are in turn absorbed by a torque arm that is attached to the axle housing, with the forward end coupled to one of the stiffest cross members of the frame by a spring support that prevents a direct stress being communicated. This torque arm is vertically pivoted at the rear end.

On the rear axle sleeves are turned the journals for the seats, and the spring seats are free to turn on the sleeves, so there are no torque stresses, and the sleeves are coupled the rear ends of the heavy radius rods. The forward ends of the radius rods are swivelled to heavy hangers attached to the frame. The sleeves are anchored by a truss that extends beneath the centre of the housing. Elliptic springs are shackled at both ends and are free to thrust or braking strains upon them.



Phantom View of the Pierce-Arrow Five-Ton Truck Rear Axle, Displaying the Worm Shaft, Gear Wheel and Spur Gear and Pinion Differential.

The worm and worm wheel are mounted in ball bearings in the heavy cover plate of the centre of the axle housing, and this plate is designed to maintain the worm and worm wheel in perfect alignment. The worm is carried on Hess-Bright annular ball bearings at either end, and an S. K. F. double-ball thrust bearing at rear absorbs all thrust, no matter whether the truck is driven forward or backward. The worm wheel is very carefully centred in the cover so as to have full bearing on the threads of the worm. The wheel is rigidly bolted to the steel case containing the differential, and this case is mounted on very large Hess-Bright annular ball bearings with a separate thrust ball bearing at either side. These bearings are on spherical seats, so that no bearing can support more load than another. The cover plate carries the entire assembly, and after adjustment is made at the factory no attention is necessary other than lubrication.

The bearings are of such liberal proportions that no adjustment is needed and this insures against any change of alignment. When the cover plate is installed the assembly must be complete and perfect. The driving shafts are chrome nickel steel and are made with fluted or channelled ends, and these ends engage with the differential gears and with the driving plates that are bolted to the wheel hubs. The ends of the shafts move freely in the differential gears and driving plates, so that there can never be end thrust nor side pressure, even were an axle housing sprung.

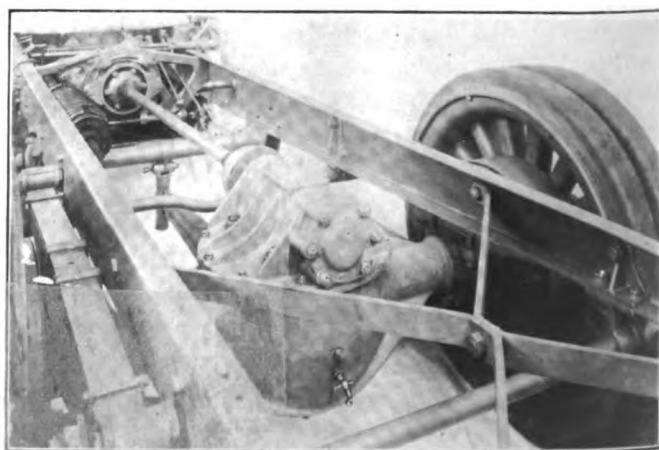
The axle is lubricated with a heavy oil that fills the housing to the level of a plug about two inches below the centre, and two inches below this plug is a petcock. When the oil level is reduced to that of the petcock the axle should be drained and filled to the plug level with new oil, this operation requiring about 18 quarts of lubricant, which will suffice for at least 5,000 miles of operation. Stuffing boxes for the driving shafts insure against leakage of oil. As the entire driving mechanism is operated in a bath of oil, there is practically no wear, and the ball bearings are of such size that besides having very large factors of safety they will constantly endure strains that never be more than momentary.

The worm is case hardened steel and the worm wheel is special bronze, and as the steel worm revolves about eight times as fast as the worm wheel, the life of the two members is approximately the same. They are guaranteed for a year, but they have been found to wear a much longer time. In operation these axles are practically noiseless.

The motor is a four-cylinder, water cooled type, with bore of $7\frac{7}{8}$ inches and stroke of six inches, rated at 38 horsepower by the S. A. E. formula, with three main bearings, the lubrication being by gravity from a tank above the motor, the oil being circulated by pump. The two independent ignition systems are by a Bosch high-tension magneto, and by a timer, master coil and storage battery. The carburetor is a Pierce-Arrow design and is an automatic float feed type. The motor is cooled by a circulation of water by a centrifugal pump through a horizontal tubular radiator. The radiator is so suspended as to fully protect it.

The clutch is a leather-faced cone, with double universal joints between it and the gearset. The gearset is a sliding gear selective type with three forward speeds and reverse. Two universal joints insure the alignment of the main driving shaft. The service brake is a contracting band on a drum back of the gearset case, and the emergency brake shoes operate in drums on the rear wheels. A ratchet and pawl back of the gearset case prevent the truck moving backward on a hill, and make possible starting on a grade after releasing the brakes. The wheelbase is 168 inches and the tread 69 inches. The bearings are all annular ball or roller, aside from the motor, and provision is made for perfect lubrication.

The two-ton Pierce-Arrow truck has practically the same design as the larger, differing only in minor details. This machine was developed with the practical experience gained with the five-ton truck, and it has been used with extreme satisfaction since it was placed in the market. Pierce-Arrow trucks are sold with the guarantee to the purchasers of the very thorough and systematic service that insures from all machines the economy and efficiency that have been proved to be their most predominating characteristics.



The Rear Axle Construction of the Pierce-Arrow Five-Ton Truck, Reference to the Full Floating Axle, the Brakes and Suspension.

SAURER FIVE-TON DUMPING TRAILER.

HANDLING soft bituminous material, such as is generally used for construction purposes, has been a problem of large proportions with every concern producing or utilizing it, and haulage has been the phase that has been the most puzzling to engineers, mechanics and chemists who have undertaken to economize in this particular direction.

Asphalt or tar will become viscous from heat and will harden from lowering temperatures, and they must be heated so that they can be worked, either at the job or at a plant where they can be conveniently hauled and in such condition that they can be applied. If the work is of sufficient proportions the preparation may be carried on there, but if not, or if of a character that precludes this, then the material must be hauled from the place where it is made ready for use.

Asphalt street surfaces are very frequently constructed in large cities, and in New York City, where there are several hundred miles of this paving, a number of companies that operate in the Metropolis and its suburbs are located, being engaged in both construction and maintenance work. The general custom is to prepare the material at a central plant and deliver it heated at the job, in some instances from five to seven miles distant. The haulage distance is limited by the time required for transportation, for the material cannot be heated to a degree where it will be burned and made unfit for construction, and neither can it be delivered too cold to be utilized, at least without additional labor.

With horses the distances practical are comparatively small, and with construction where job preparation is needed there is necessarily expense entailed from the transportation of the materials, but the work can be done in such conditions that might be regarded as ideal for obtaining satisfactory results. With motor vehicles the distance that material can be hauled from a plant must be measured by the time a load will remain sufficiently heated to be practically workable, and, of course, this will depend largely upon the atmospheric temperature. The cost, of course, is another factor to be dealt with, comparison to be made with job preparation expense.

So far as the haulage of material prepared at a plant is concerned the conditions may differ decidedly, so that even approximation of distance cannot be made, but from seven miles as an average, and possibly 10 miles with more than ordinarily favorable factors, may be regarded as the limit. That is, between seven and 10 miles the question of job preparation is debatable, and be-

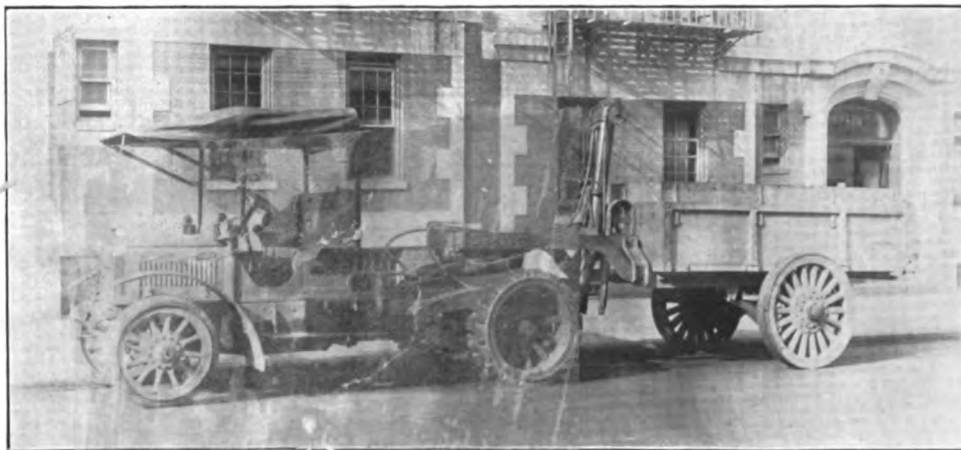
yond 10 miles road transportation is extremely doubtful.

With motor trucks, concerns engaged in asphalt or tar construction have endeavored to adapt bodies that are satisfactory, generally utilizing hoisting equipment that will elevate to an angle of 45 degrees to insure gravity discharge without shovelling or raking, so that the machines may be kept moving with minimum stops. Such units as this have the advantage of requiring small space for operation, but with capacity loads a decided handicap is the poor traction that can be obtained in soft surfaces, such as are generally found where construction is going on.

The Borough Asphalt Company, Brooklyn, N. Y., has this year placed in service seven Saurer tractors, built by the International Motor Company, which are of considerable interest from the fact that they are used with single trailers that are equipped with hydraulic hoists. This construction has not been adopted by any other concern, and attention has been directed toward this installation with a view of learning its actual efficiency as compared with other types of equipment that have become conventional or are in frequent use.

The statement is made that the trailer transportation is more flexible in that a heavier load can be handled in adverse conditions, such as the carrying of capacity loads in streets in which construction is progressing, or in excavations where foundations are building, or work of this nature.

The tractor is a regular Saurer chassis with a 128-inch wheelbase, and on the rear end of the chassis is a construction that may be likened to the "fifth wheel" of the heavy cart or dray. This consists of a large diameter ring in the centre of which is a fitting which takes a vertical coupling pin that corresponds to the horse vehicle king bolt. The trailer body is mounted on a channel steel frame that is supported by semi-elliptic springs on the dead rear axle of the trailer. The centre of gravity of the body is forward of the axle, but the greater part of the load is carried by it.



Saurer Tractor and Five-Ton Trailer

Equipped with Hydraulic Hoist Dumping Body, Borough Asphalt Company, Brooklyn, N. Y.

The trailer frame is full width of the body, but is considerably "necked" forward of the body and to this portion of the frame is attached the upper half of the "fifth wheel", so that the front end of the trailer is carried by the rear end of the tractor, and the halves of the turntable are coupled so that the tractor may move at right angles to the trailer, for turning, for instance. The trailer body has capacity of 100 cubic feet, which will take approximately five tons of asphalt. The trailer is mounted on very large wheels that are shod with steel tires.

With the large wheels and wide tires the trailer will move easier than with smaller wheel equipment, and with the body carried on a single axle the elevation can be made to the full height with a greater length below the chassis frame. With these trailers the discharge is made through an end gate and the body is hoisted by a Wood hydraulic hoist that is mounted on the trailer frame forward of the body and behind the turntable. The oil tank and pump used for operating the hoist are installed on the tractor, and the connection between the tank and the cylinder of the hoist is by flexible pipe. The oil pump is operated by the driving shaft and it is controlled by the driver from his seat. The angle of extreme elevation is 45 degrees.

The body is constructed of wood, lined with sheet steel, and it is 126 inches length, 54 inches width at the forward end and 60 inches width at the rear, with depth of 24 inches. Between the steel lining and the wood is a half-inch layer of sheet asbestos that is intended to retain the heat, so that when the asphalt is sent out heated to 300 degrees it will be delivered in condition to work. The trailers and tractors are interchangeable, attaching or detaching being a work requiring a very short time, and the disconnection or connection of the flexible pipe is quickly done.

BUILDING NEW FACTORY.

A single-story and basement building, which is designed for the addition of four more stories in the event of need, is now building at University avenue and Pelham street, St. Paul, Minn., for the Ware Motor Vehicle Company. The company is to use the structure for the production of the Ware four-wheel driven trucks, which are stated to have many qualities to recommend them.

John L. Rainier and Paul N. Lineberger have retired from the R. & L. Company, Inc., which for a considerable length of time has been the agent for Garford trucks and Willys Utility wagons. The company is now controlled by the Willys-Overland Company.

J. W. Bayard, formerly with the Garford Company, and now representing the sales department of the Signal Motor Truck Company, is devoting his activities to the Pacific Coast territory.

WILL SPECIALIZE BLAIR TRUCKS.

The Blair Motor Truck Company has been organized to succeed the Blair Manufacturing Company, Newark, O., and the plans for the succession have been perfected. The latter company was a large producer of agricultural implements and engaged in the manufacture of several types of worm and worm wheel driven trucks. A feature of the Blair machines has been the drive through a sub-frame, coupled to the forward member of the chassis frame, this affording what is termed the Blair direct drive.

The success with these machines has been such that decision was made to abandon the manufacture of agricultural implements entirely, and specialize on vehicles. The new corporation has additional capital and many of the old stockholders have continued their holdings in it. The original company will be continued until the stock of farming machinery is disposed of, after which it will be dissolved. The Blair line will be increased by the addition of a five-ton chassis, one of which is now building for use with a double-deck body in passenger service. The company has been incorporated with \$100,000 capital by J. P. McCune, C. A. Smith, C. H. Spencer, R. W. Smith and W. S. Weiant.

ENGLISH MOTOR FUEL PROBLEMS.

The demand for gasoline in cans for army purposes, and the fact that some of the motorists have purchased considerable supplies in anticipation of an increased price or a shortage of fuel, has very largely removed from the market the normal supply of fuel in cans, and English motorists now face the American method of purchasing from tank wagons or taking delivery of 50-gallon steel barrels or drums. Much of the better grade of fuel has been commandeered for the army and navy aeroplanes, and there appears to be much uncertainty as to the quality of the gasoline that is bought in bulk.

TRAIN LOAD OF RUBBER

The largest shipment of high-grade crude rubber ever received by any American concern was recently sent out from Staten Island, N. Y., to Akron, O., consigned to the Goodyear Tire & Rubber Company. The consignment was in 40 large freight cars, which made a complete train. The cars were decorated with banners, which stated the character of the load and its destination.

The Lambert Manufacturing Company of Anderson, Ind., of which J. W. Lambert is president, has secured six acres of land at El Segundo, Cal., on which erect a factory. A building measuring 60x200 feet will house the plant, which will manufacture motor trucks. S. J. Smith is the manager.

ECONOMY OF TRAILERS.

Specially Constructed Vehicles Successful in Proper Conditions.

The question of the advisability of using trailers with motor trucks is one which is being considered by a great many business men who are contemplating the matter with relation to their own needs. The question has been thoroughly investigated and reported upon by 12 makers of largely used trucks, and they have reported their findings in response to a request from the Automobile Chamber of Commerce.

The preponderance of opinion is decidedly against the use of trailers with trucks, except under the most favorable conditions of road, slow speed and proper handling. Under such conditions the standard truck can be used successfully to haul trailers, but the report says this should not be done without the consent of the manufacturers, as such use is not included in the guarantee of the makers. Makers, however, do not encourage the practise without examining and approving the circumstances and the field of operations. Except under the most favorable conditions the use of trailers is stated to be of doubtful economy.

Standard trucks are built for a definite load and speed, and as most of the trailer work is outside of cities on poor roads and steep grades, they usually are not rugged enough to handle this additional burden. For this work a powerful engine, large bearing surfaces, strong construction throughout and a clutch that will start the load without a jerk are necessary qualities of the truck. A horsepower and gear ratio proportionate to the weight of the load to be moved should be employed.

When the conditions where the trailers are to be used are not exceptionally good, both truck and trailer should be specially constructed. To secure economy of fuel in gasoline machines, the tractor should have five or six possible changes of speed. Some success has been achieved with the use of trailers which were built as wagons and drays to be drawn by horses, but they are so soon shaken to pieces that they can be run only at slow speed, at which little economy is secured. Successful trailers must be built with the same strength of construction and with the same type of bearings as the tractor, though not necessarily quite so heavy.

There is a demand for a combination truck and trailer capable of carrying from 10 to 12 tons. A good four-wheel trailer to carry five tons weighs about half as much as a five-ton truck, but the trailer should be as light as possible under the weight of load to be carried, speed to be attained and conditions of roads. The trailer's capacity should not exceed that of the tractor itself.

The type of trailer to be used depends on the nature of the load to be carried, though the greater economy results from the use of the four-wheel type,

because with it the truck can be used alone, while the trailer is being loaded, which cannot be done when the two-wheel trailer is employed. Several state laws bear on the question of the use of trailers. Massachusetts, New York and Maryland limit the weight of vehicles and loads on highways to 28,000 pounds; New Jersey to 26,000, and Pennsylvania to 24,000 pounds. A two-wheeled trailer with truck therefore could carry only nine tons in the first three states and less in the others. A four-wheeled trailer would probably be considered a separate vehicle, with the consequent increased lawful carrying capacity.

KISSELKARS FOR BUTTE, MONT.

After exhaustive tests of various types of trucks, the city of Butte, Mont., has purchased three Kissel-Kar trucks, made by the Kissel Motor Car Company, Hartford, Wis. These are to be used in the department of public works, two for the collections of refuse and the third for transporting a sprinkling and flushing outfit. Missoula county, Montana, has used two Kissel-Kar dump trucks with good results, following which the new machines were purchased through the Treasure State Auto Company of Butte.

EIGHTEEN BUICKS FOR FIRE CHIEFS.

Eighteen new Buick cars, made by the Buick Motor Company of Flint, Mich., have been purchased for the district fire chiefs of Boston. The first Buick bought for use by the Boston fire department five years ago is still giving good service after being run 138,000 miles over the city pavements and has capacity for much longer good service.

A municipal markets commission has been appointed by Mayor Harrison of Chicago to study the feasibility of establishing municipal markets. It has been found in the course of the investigations that the average cost of hauling by motor truck in Chicago is 11½ cents a ton-mile as against 17¾ cents by horses. The cost per package of delivery vehicles is eight cents a package for the motor types and 16 cents by horse vehicles.

The Field stepless electric 'bus is now making regular trips in New York City to demonstrate its practicability. The New York 'Bus Company has applied to the city for a franchise to operate these 'buses on regular lines.

The Studebaker Corporation, Detroit, Mich., and South Bend, Ind., recently declared its regular quarterly dividend of 1¾ per cent. on preferred stock, payable Sept. 1 to stock of record Aug. 20.

The Safety Fire Motor Car Company, Kalamazoo, Mich., has been organized with a capital stock of \$10,000 to make fire apparatus.

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., OCTOBER, 1914

No. 10

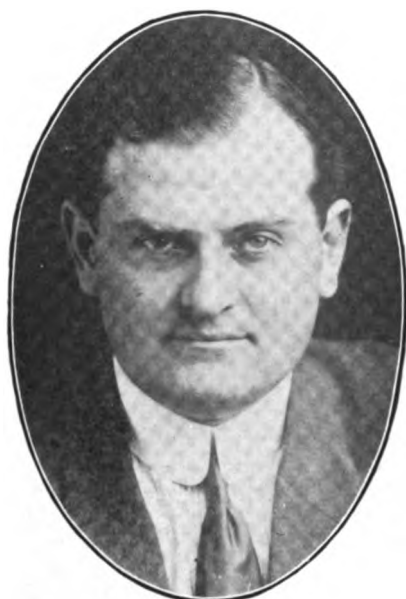
MOTOR TRUCK INTERESTS CONVENE AT DETROIT.

Representatives of Industry and Trade and Private Owners Consider Many Subjects of Mutual Interest and Authorize Committee to Determine Whether to Form an Independent Organization or Join an Existing Body.

THOUGH hastily organized, and without the preparedness that would be expected of a permanent association, the convention of motor truck manufacturers, dealers and owners, at the Hotel Cadillac, Detroit, Mich., Oct. 7-10, was productive of results in that it was attended by about 300 different men who represented the three general classifications stated.

The convention was called by the Motor Truck

club of the country, and during its existence has become a decided factor for the promotion of the use of freight power vehicles in the metropolis, but the proposition for a convention to be conducted by it, that would be representative of the industrial and trade interests, when the body itself may be regarded by many as representing general rather than specific purposes, could not be expected to have universal support or sanction. That is, there are those who, while approving the con-



George H. Duck, President, Motor Truck Club of America, of New York City.



W. K. Ackerman, Secretary, Standard Motor Truck Company, Chairman Committee of Arrangements.



Ellis L. Howland, Secretary, Motor Truck Club of America, of New York City.

Club of America, which was given the co-operation of a committee representing various industrial interests of Detroit, and the resources of the bureau of conventions and tours of the Detroit Chamber of Commerce was placed at the command of the committee. Considering the limited time for organization and preparation the committee did excellent work.

The Motor Truck Club of America is located in New York, N. Y., with affiliated members throughout

the country, and during its existence has become a decided factor for the promotion of the use of freight power vehicles in the metropolis, but the proposition for a convention to be conducted by it, that would be representative of the industrial and trade interests, when the body itself may be regarded by many as representing general rather than specific purposes, could not be expected to have universal support or sanction. That is, there are those who, while approving the con-

vention and its objects, were hardly willing to participate until the general sentiment of the industry and trade had been definitely determined. The peculiar business conditions, the proximity of the annual convention of the Electric Vehicle Association of America, the lack of time, and various other causes precluded numerous concerns taking part, but for an initial convention, which might be looked upon as the foundation for developing either a permanent



**George D. Wilcox, Sales Manager,
Commerce Motor Car Company,
Secretary of General Committee.**



**A. C. Burch, General Manager, Sig-
nal Motor Truck Company, of
General and Finance Committee.**



**J. Lee Barrett, Secretary-Treasurer,
Detroit Convention and Tourists'
Bureau, of Publicity Committee.**

association, or the formation of a division of one of the existing industrial bodies, the assemblage was successful. The tangible result was consideration of the organization of a motor truck manufacturers' association, and with a view of determining the opinions of the different interests of the industry and trade a committee was appointed which will obtain from all concerned a definite statement.

This committee is headed by D. F. Poyer of the D. F. Poyer Company, Menominee, Mich., and it is authorized to first obtain expressions from all manufacturers of motor trucks and wagons of America, next to consider these, and then to make recommendation to those communicated with whether, in the judgment of the committee, a separate association should be formed, or one of the industrial or trade organizations should be asked to establish a division or department which will be conducted for the general promotion of the interests of the manufacturers of, dealers in and owners of motor driven freight vehicles. This committee has already begun its work and it will make report as early as is practicable.

There is no question that the convention was productive of material interest, for it brought directly to the attention of the industry and trade the possibilities from concerted ac-

tion. The only industrial body that now exists is the Automobile Chamber of Commerce, which has a commercial car committee, and this conducts a department that is devoted to general stimulation and promotion of the use of motor wagons and trucks, but only 33 truck manufacturing concerns are represented by this organization. There are no trade or owners' associations, aside from locality bodies, and the activities of these are with reference to community requirements rather than with any specific objects.

The papers presented covered a very wide range of subjects, and generally these had been prepared with considerable thought, but if there was any criticism made it was to the effect that the committee had undertaken too much, and for that reason there was not the concentration on what might have been regarded as the prime object, the organization of the industrial and trade interests, although many of the speakers dealt with the conditions that now obtain and which ought to be improved. The convention programme was conducted by a new officer each day, this making the duties of the chairman less burdensome. For the



Group of the Delegates to the Convention of Motor Truck and Equipment Manufacturers



John Squires, Signal Motor Truck Company, of Committee of Arrangements.



L. C. Freeman, Chief Engineer, Denby Motor Company, Detroit, Mich.



G. A. Wood, Wood Hydraulic Hoist Company, Detroit, Mich., One of the Speakers.

benefit of the delegates and others who may be interested a stenographic note was made of the discussion, and copies of this will later on be distributed for the information of those who desire precise knowledge of the statements made with reference to any given subject.

The convention has developed much food for thought, provided, of course, that there is a desire to obtain the co-operation and the stimulus that is practical from individual and association endeavor, and suggestion has been made that an organization that could apply its activities through branches or local or sectional units, these to be formed wherever expedient, might serve an immensely useful purpose. There is without question a need for the protection and promotion that can obtain from confederated or affiliated associations, and with those who participated in the convention, at least, the principal problem is how this can be best obtained.

The delegates to the gathering continued to arrive for the first two days, and with the increase of numbers the interest became more pronounced and the

proceedings were engaged in with greater enthusiasm. The evening of the first day the company was entertained by a smoker and vaudeville programme arranged by the members of the Detroit committee, and the second evening there was a large party at the Temple theatre, the host being the Detroit organization. The banquet the evening of the third day was a decidedly interesting event. It was at the Cadillac hotel and James Schermerhorn of Detroit was toastmaster. The principal speakers were Walter Wardrop of the Power Wagon, Chicago, Ill.; John Lee Mahin of the Mahin Company, Chicago, Ill.; Capt. Godfrey L. Carden, United States Revenue Marine Service, and B. F. Reimhold of Detroit, who made a clever satire on the motor truck industry.

Captain Carden spoke interestingly on the foreign market, with particular reference to the Panama-Pacific exposition. His experience as a special representative of the Department of Commerce in Europe was especially instructive.

Invitations were received from the mayor of Buffalo, N. Y., and from the Chamber of Commerce of that city to hold a convention in Buffalo in 1915, and the advantages of Detroit as a convention city, and the desirability of holding a convention at San Francisco during the Panama-Pacific exposition was also presented.



Selling Representatives and Vehicle Owners, Held at the Hotel Cadillac, Detroit, Mich., Oct. 7-10.

TIME PAYMENTS APPLIED TO SALES OF TRUCKS.

Credit Given Purchasers Has Proven Practical and Profitable and Has Developed Business.

"TIME Payments as Applied to Commercial Vehicles", was the subject of a paper by Walter B. Parker, president of the Commerce Motor Car Company, who said in part:

The growth of the motor truck industry as compared to the pleasure vehicle industry has been slow. One of the arguments with which the dealers have been met almost invariably,

I believe, has been that the merchant, who may be in very excellent financial standing and who obtains credit because of that financial standing against his purchase of merchandise, can purchase because of that credit any of the other modern business devices required in the use of his business; in many cases upon deferred time payments of such duration, that he is enabled to pay their cost in some part through the savings made by the use of these devices; and he naturally demands, and has the same right to expect the opportunity of buying a truck also on credit. From investigations conducted by my company I am confident that the motor truck industry will grow very much more slowly if the rules governing the sale of pleasure vehicles are rigidly adhered to.



Walter B. Parker, President, Commerce Motor Car Company.

However, if some means can be devised whereby motor trucks may be put in service under conditions of payment which will remove the difficulty surrounding their purchase by the average American merchant, we would very soon see an increase in the use of motor trucks. Some time ago the company of which I am president inaugurated in several cities a plan to sell its commodity on a time payment basis. Our trucks list at \$975. We offered them on the following terms:

Three hundred and fifty dollars down and the balance in 10 equal monthly payments, the deferred payments being secured by a conditional bill of sale or chattel mortgage on the truck sold, the truck being insured against fire, theft and collision in favor of the Commerce Motor Car Company in so far as its interest would run.

In looking over our records, I found that if this plan had not been used in the particular instances, not one-third of the sales would have been effected according to my belief.

On these trucks, numbering 153, we have received payment in full with interest at 6% per annum for all with the exception of nine. On the latter we received the initial cash payment and a portion of the balance. The merchants to whom they were sold either went out of business or failed, and we were obliged to recover the trucks, which were held for security for the balance of the payments. The security recovered has in every case but one been sufficient to take care of the balance due. I may say that out of the total business done, amounting to over \$150,000, the actual amount which may be charged off as money lost, is less than \$200.

It is up to us as manufacturers to give the question of time payments sufficient thought, and by our united efforts endeavor to make it possible to immediately increase the use of trucks by a concerted action regarding time payments.

A time payment plan to be successful should be along hard and fast set lines and be joined in by all manufacturers. It should mean initial payment on list price at all times of a fixed per cent. of the purchase, in no case less than one-fourth, and it should mean that the entire balance due must be paid in not less than 10 months. This will preclude price cutting; it will prevent foolish competition. If all manufacturers will join it will remove many of the evils which the trade is facing today. All the manufacturers with whom I have conferred regarding this matter have been unanimous in acknowledging the need of some plan, and have agreed with me that this is a very desirable end to attain, but they add, "how can it be done?"

The factories who require their own credit standing to enable them to finance their business certainly cannot provide credit facilities for their dealers. For any individual or company alone to adopt that as a general policy would require enormous capital and would invite disaster.

THE CONVENTION PROGRAMME.

Wednesday afternoon, Oct. 7.

Presiding Officer, George H. Duck, President, Motor Truck Club of America.

Convention called to order.

Opening address, George H. Duck.

Address of welcome, Charles H. Culver.

Papers, "Time Payments, as Applied to Commercial Motor Vehicles", Walter B. Parker, President, Commerce Motor Car Company, Detroit, Mich.; Frank M. Gregg, American Commercial Company, Cleveland, O.

Paper, "Territorial Lines for Dealers", T. R. Lippard, President and General Manager, Stewart Motor Corporation, Buffalo, N. Y.

Paper, "Reforms Needed in Merchandising Motor Trucks", Jos. C. Millmann, Secretary-Treasurer, Stegeman Motor Car Company, Milwaukee, Wis.

Papers, "Evils of Overloading and Over-Rating for Trucks, and Permissible Body Weights", H. M. Alden, Timken-Detroit Axle Company, Detroit, Mich.; L. C. Freeman, Denby Motor Truck Company, Detroit, Mich., and John Squires, Signal Motor Truck Company, Detroit, Mich.

Paper, "Care of Truck Springs", J. G. Utz, Perfection Spring Company, Cleveland, O.

Paper, "Body Weights", F. A. Whitten, Chief Engineer, General Motors Truck Company, Pontiac, Mich.

Papers, "Advertising—Relationship Between Factory and Dealer", George A. Rees, Chicago Pneumatic Tool Company, Chicago, Ill., and R. P. Spencer, Advertising Manager, Denby Motor Truck Company, Detroit, Mich.

Wednesday evening, Oct. 7.

Smoker, vaudeville entertainment at the Hotel Cadillac.

Thursday morning, Oct. 8.

Presiding Officer, Walter Wardrop, Chicago, Ill.

Paper, "Lists, Discounts for Quantity Business, Discounts for Parts, Stock of Parts to Be Carried, and Percentage of Parts to Be Owned by the Maker and the Dealer", M. L. Pulcher, Vice President and General Manager, Federal Motor Truck Company, Detroit, Mich.

Paper, "Traffic Engineering", E. L. Schumacher, Traffic Engineer, Denby Motor Truck Company, Detroit, Mich.

Joint paper, "The Use of Motor Trucks on Farms", D. F. Poyer, D. F. Poyer Company, Menominee, Mich.; Hugh McVey, Advertising Counsellor, Successful Farming, Des Moines, Ia. (illustrated), and William Galloway, Dart Manufacturing Company, Waterloo, Ia.

Paper, "Export Selling Methods and Requirements for Motor Trucks", J. B. Crockett, Export Manager, Commerce Motor Car Company.

Topics for Discussion: "Deposits on Sales", "Advertising Campaigns in Relation to Distributing Territory".

Thursday afternoon, Oct. 8.

Paper, "Causes and Effects of Overloading and Overspeeding", S. V. Norton, Manager Truck Tire Sales, B. F. Goodrich Company, Akron, O.

Paper, "Proper Load Rating for Truck Tires", Roy Harris, Firestone Tire & Rubber Company, Akron, O.

Paper, "Standard Tire Sizes" (illustrated), J. E. Hale, Experimental Engineer, Goodyear Tire & Rubber Company, Akron, O.

Thursday evening, Oct. 8.

The delegates were the guests of the Detroit committee at a party at the Temple theatre.

Friday morning, Oct. 9.

Presiding Officer, David Beecroft, New York, N. Y.

Papers, "Manufacturers' Guarantee and Service to Owners" (from the manufacturers' viewpoint), W. L. Day, General Manager, General Motors Truck Company, Pontiac, Mich.; (from the dealers' viewpoint), J. H. Thompson, Thompson Auto Company, Detroit, Mich., and W. C. Cronkright, Duquesne Motor Car Company, Pittsburgh, Penn.

Paper, "Demonstrations—Necessity and Charges", J. C. Ayers, District Manager, General Motors Truck Company, Pontiac, Mich.

Friday afternoon, Oct. 9.

Papers, "Driver's Relation to Successful Motor Truck Operation", C. P. Cary, Federal Motor Truck Company, Detroit, Mich.; H. S. Dunlavy, Federal Truck Company of Chicago, Chicago, Ill.

Paper, "Standardization of Cost Forms", Rollin W. Hutchinson, Jr., Sternberg Motor Truck Company, Milwaukee, Wis.

Paper, "The Field for Medium Sized and Small Trucks", E. S. Foljambe of the Commercial Car Journal, Philadelphia, Penn.

Topic for discussion, "Contract Delivery Work".

Friday evening, Oct. 9.

Banquet at Hotel Cadillac, Toastmaster, James Schermerhorn.

Saturday morning, Oct. 10.

Presiding Officer, Walter B. Parker.

Paper, "Mechanical Hoists and Dump Bodies for Motor Trucks" (illustrated by working models), G. A. Wood, Wood Hydraulic Hoist Company, Detroit, Mich.

Paper, "Motor Truck Manufacturers' Association of America", Rollin W. Hutchinson, Jr., Sternberg Motor Truck Company, Milwaukee, Wis.

Topics for Discussion: "Railroad Co-Operation in Developing Interest and New Fields for Trucks", "The 1915 Convention".

MERCHANDIZING REFORMS—LIST PRICES AND DISCOUNTS.

Changes of Methods Necessary to Purge the Industry of Conditions Limiting Its Growth.

CONSIDERING "Reforms Needed in the Merchandizing of Motor Trucks", Jos. C. Millmann, secretary-treasurer of the Stegeman Motor Truck Company, Milwaukee, Wis., stated in part:

Cutting of Prices: The most serious offender is the cutting of prices. This, I claim, the manufacturers alone can control. While this evil exists in all lines of trade it, no doubt, has been more serious in our industry than in any other, and it has worked more havoc and ruin. It must be cured. Prices must be maintained. All business enterprises are built up, financed and fostered on a definite basis with fixed prices for cost of manufacture, cost of selling and a reasonable percentage for profit. The selling price is determined after these other figures are established, and it must be maintained in order to insure profit and enable both the manufacturer and dealer to continue his business. If these prices are seriously interfered with, they are going to take it off from the profit end, with the result that either one will be operating at a loss and the original capital impaired, which sooner or later means discontinuance of business.

The cutting of prices in all lines of business is due mainly to over-production, to inexperienced and inefficient salesmen. Over-production is strictly up to the manufacturer. * * * The largest, as well as the smallest, manufacturers have been guilty of this evil. The only remedy is more conservative factory management, more sane speculation and quantity of production based on a different basis than trying to beat the other fellow in volume.

Inefficient Salesmen: The manufacturer is responsible for his inefficient salesmen whether direct factory representative or agency; he should train his men in salesmanship; he should keep himself thoroughly posted on the advantages and quality of his product so when he meets competition he has something else besides price to sell and for which to ask an order. If he is well equipped he can wage a long fight on the quality basis, and secure his figure and order without cutting. If he is ill-posted—does not know the merits of his own product and is in competition with a better man, the only argument he possibly can rely on is price, because he knows none other. If manufacturers have quality, the agents and salesmen should thoroughly know them to be able to convince the buyer why he is asking what he is asking.

Improper Ratings: An evil which is somewhat disappearing is that of improper ratings and fictitious list prices. There ought to be some way of determining what constitutes a 1½-ton or a three-ton or five-ton truck. The great difference in list prices when analyzed, is nothing more or less than a difference in rating. This evil exists to a greater extent in the smaller sizes for the simple reason that the newer manufacturers are entering into the smaller fields and with inexperience, are placing ratings upon their machines which practice will not substantiate.

Overload Guarantee: The agents in their eagerness to satisfy a customer will promise overload ratings and capacities in order to give their prices the advantage over a larger capacity truck. The result is a dishonest sale, which the user, as well as the manufacturer, must suffer for.

The Trading Evil: I am afraid that the trading evil will always be with us. However, there is a way to make it less of an evil and that is by educating the buyer to the idea that the agent or manufacturer of the new truck is in no way responsible for his old worn out truck and should not be made to shoulder the burden of his original purchase—whether it was a good or a poor purchase. We should endeavor to establish a custom that the agent does not take in an old truck in trade at any fixed price. Let the agreement be such that he will sell the prospect's machine for him at the best figure obtainable and let the prospect put a minimum figure on it.

Another way to remedy this is to see that the salesmen do not sell trucks that are improperly suited. * * * Let us try first of all to prevent second-hand trucks being on the market, and secondly, make the buyer shoulder the responsibility for the second-hand truck and not the new salesman.

Time Payments: This should be put upon a reasonable basis, one which the agent and manufacturer can assume without any risk. There should be a fixed minimum amount of percentage of one-half or at least one-third paid in cash at the time of delivery. The remaining payments to be paid well within 12 months' time. If any buyer has not the funds or capital to purchase a motor truck on this basis, he is hardly a fit purchaser. If he is unable to go to his bank and have the banker finance him, what right has the dealer or manufacturer to take the place of a banker after the banker has refused to take the chance of the loan. The time payments of motor trucks cannot be compared with the time payments covering furniture, household goods, pianos, etc., for the simple reason that a motor truck, if improperly cared for, depreciates at an entirely different ratio—it is an article that is subject to immediate wear and accordingly change of value. The evil known as "salesmen knocking", pretty much takes care of itself. To my mind, there is no such thing as a good knocker.

Maintenance of Selling Values and the Needs of Stocks of Parts Two Material Selling Factors.

DURING his paper on "Lists, Discounts for Quantity Business, Discounts for Parts, Stocks of Parts to Be Carried and Percentages of Parts to Be Owned by Makers and Dealers", Vice President M. L. Pulcher of the Federal Motor Truck Company, Detroit, made these statements:

In the first place, with regard to lists, we find 1000-pound trucks and 1500-pound trucks listed from \$900 to \$1500; we will find 2000-pound trucks listed from \$1000 to \$2500; we will find 3000-pound trucks listed from \$1500 to \$3000; 4000-pound trucks from \$1650 to \$3250 and \$3500, and 6000-pound trucks from \$2500 to \$3750. So you can readily see that the list does not mean anything. There is no standard of list anywhere. Each fellow seems to have a different list, according to his method of figuring his costs, the method of overhead and other items that go into the final selling price of his vehicle. Either he is working it two ways, putting a high list, so that he thinks his dealer might have a little more discount in order to make a trade, or else he thinks his product is worth more money. Of course, we do not know how he is looking at that. But I think the high list is a bad thing, for the reason that you are charging more than your commodity is worth. You give your dealer a greater discount than he is entitled to, allowing him to cut prices, which will mean that your different customers have all paid a different amount of money for the same article, which is wrong. Each man who buys should buy at the same figure, and there should be no preference, other than for quantity business.



M. L. Pulcher, General Manager, Federal Motor Truck Company, Detroit, Mich., Chairman Finance Committee and of General Committee.

Discounts for quantity business: We find discounts for quantity business in effect today up as high as 50 per cent. One of our large manufacturers makes a discount of 50 per cent. We know this to be a fact because we are working on the business all the time, and we cannot get it. And we find other large manufacturers making a discount, maximum of 7½ per cent. for a contract of a hundred. But we find discounts for quantity business from five to 7½ and 10 per cent. While it is hard for me to say to you that there is any certain standard of discounts which should be in effect for your goods, because I do not know at what price you can afford to sell them, I should think that single orders, not quantity business, should always be net. Take an order for five, if you can get it on a cash basis, five per cent. ought to handle it. A lot of 25, say 7½ per cent., 50 and up, 10 per cent. You have got to keep in mind, if you have any organization amongst your dealers, that this purchasing point distributes the trucks in different places around the country, and there must be some compensation go with the trucks to these other parts, so that the truck may be properly serviced. Consequently, you can't afford to go into any of the large users and give him a very large discount, because if you did, you have got nothing to service that truck, and then it comes back on to you. You can't afford it.

Discounts for parts: Without a doubt we all express our parts at a certain list price, which list price in my estimation should not equal more than the selling price of your completed vehicle. That is, if your truck sells for \$2000, your list of parts should not be over \$2000, less the tires. You can get by with it, and it is a strong selling argument in your favor. From the list there should be a certain discount, and I would recommend the same discount as you get on your truck, which might be 20 or 25. Or it might be an additional discount for cash on the 10th of the month following shipment, or in 10 days, or however you wish to handle it.

Stock of parts to be carried: The stock of parts to be carried, if the dealer had the money that was necessary, could be figured out very easily on the number of trucks sold in a town and the distance from the factory. But, as a rule, the dealer is not very flush, and he cannot carry the parts that he should carry.

SERVICE—EXPLOITATION OF FOREIGN MARKETS.

Owner Should Be Responsible for the Care and Use of His Property and Not the Builder.

GENERAL Manager W. L. Day of the General Motors Truck Company, Pontiac, Mich., whose paper was on "Manufacturers' Guarantees and Service to Owners", after stating that the warranty of the National Automobile Chamber of Commerce seemed to cover all that was necessary, but in his opinion the period of warranty should be longer than 90 days, principally for the psychological effect, stated the following:



W. L. Day, General Manager, General Motors Truck Company, Pontiac, Mich.

After automobiles proved a success as pleasure vehicles the motor truck for commercial purposes came into being—and it came rapidly—competition became fierce. Business men wanted motor trucks, but the prices were high. The truck was a strange animal and the customer was shy. Then, as manufacturers we began to make foolish promises. We said: "You need not be afraid of it, we'll take care of it for you, inspect it every night and furnish any new parts that may be needed". While we didn't say, "Let your drivers abuse it and neglect it and we'll stand for it and keep it on the job without expense to you", we inferred it, and the keen competition furnished the incentive for each fellow to invent some

new promise in the way of "service". Gentlemen, we were all wrong and, speaking for our own company, we decided at the beginning of this year to get right.

We believe the first service to our customer is to intelligently analyze his haulage problem and not only recommend, but insist on his buying the size and kind of truck that is adapted to his business—that will be the most profitable for him to operate.

The next service is to be careful to see that the truck he gets goes to him in good working order. The next service is to see that the man who is to operate the truck is thoroughly instructed in the way to use it, as well as in the way to not abuse it—to caution him against overloading and overspeeding, and to also impress these things on the man who pays the bills.

At that point we consider the truck the property of the man who bought it and try to make him feel the responsibility for its proper care and maintenance. Another service that is due the customer is to provide a stock of parts at our nearest service station so that in the event of breakage a new part can be supplied without unnecessary delay. If a part is broken and it proves to be defective the new part should unquestionably be supplied without cost to the owner.

In our organization we have our field service men and our regular salesmen about the country; and if any serious trouble develops we promptly dispatch a man to look after it. This service we do not charge for, but if work or repairs are needed because of the abuse of the truck by the owner we expect him to pay for it.

It is the duty of the salesmen and service men to keep in touch with owners and offer them advice when needed, but we do not promise a customer that we will "inspect" his truck at regular intervals, for the reason that such a service would be impracticable in the conduct of a national business without adding an expense that would increase the price of trucks to the user.

Neither do we promise to furnish a spare truck to be used while the customer's is undergoing repairs, for this also is a promise that no manufacturer who does any considerable amount of business could live up to without going bankrupt.

To sum the matter up, I believe the motor truck business should be conducted the same as any other legitimate business. Give the customer value received in his initial purchase, instruct him in the proper use and care of his truck and make your guarantee good—co-operate with the customer to enable him to get the best results from his purchase, but insist that he assume the responsibility of caring for and insuring his own property.

Specifications to Meet Requirements of the Localities and Conforming to Demands of Trade.

"EXPORT Selling Methods and Requirements for Motor Trucks" was the subject of a paper by J. B. Crockett, export manager of the Commerce Motor Car Company, Detroit, Mich., in which was stated:

In my remarks as to the method and requirements for selling motor trucks abroad and the opportunity of developing a staple business I am referring particularly to the territories of the countries of the Far East, Australia and South Africa, and to a slightly less extent also South America. I am not taking into consideration the continental European market, but am considering the other markets under the conditions which existed there up until the beginning of the war and which will again exist upon the cessation of hostilities.

As to changes in specifications and the requirements of the trade; right hand steering is absolutely essential, but control levers may be central. There is a slight preference for worm drive, but this is by no means necessary. In some localities there are restrictions as to weight, load, wheelbase, tread, width of tires, etc., and in tropical countries cooling systems must be especially efficient, but these restrictions are not serious and only affect a few smaller markets. While there is a demand for trucks from $\frac{1}{2}$ to six-tons capacity, I think that the greatest volume of sales will probably be for two, three and four-ton.

In these territories the use of trucks has to date not been taken up as a general thing by individual merchants for their own use for city delivery work, etc., but are largely used for the transportation of passengers and freight between inland points with no rail connection, the moving of produce of all kinds from warehouse to docks, for transportation of mail from steamers to distributing points, by contractors, etc., and this work is often done by transportation companies formed and operating trucks for this purpose. Trailers are very generally used and are considered satisfactory from every standpoint. When trucks are limited by law or road conditions to three tons capacity, trailers are especially used with notable good results.

European methods: The reputation of the European makers has been established by the high quality of their production, a large amount of advertising, a selection of good agents, and in many cases by their willingness to make special changes to adapt the truck to the special service for which it is to be used. Their terms are liberal, yet I do not know of any losses on account of these terms. One method of payment used with success is to have the dealer send one-quarter of the net price with the order, on shipping the manufacturer draws for the balance at 90 days sight, shipping documents to be delivered on the dealer's acceptance of the draft. This usually means that the dealer will have at least two months to sell the truck before the full payment becomes due. Failure to meet the draft accepted on these terms would be practically equivalent to bankruptcy, and as all bank charges and interest are added to the draft and paid by the dealer, the manufacturer can usually sell his draft with recourse and in this way receive cash at the time shipment is made. In many cases parts are stocked on consignment, but I do not think this will be necessary for American manufacturers to consider if they are prepared to meet the other terms to a certain extent.

A great deal depends on securing dealers strong financially and of the proper standing and ability. It might be well for American manufacturers to consider and remember that in export business they are much more dependent on their representative or dealer for sales, and the standing of their goods, and that usually dealers know to a large extent, what they want for their territory, and tact will have to be used when their wants seem wrong to the manufacturer.

As to service which the dealer maintains, this varies largely according to local competition, but for the manufacturer I would not advise extensive guarantees for replacement, etc. The dealers are more self-reliant as a rule than those close to the factory, and in my opinion this should be encouraged. If a good dealer is secured and help given him in the way of advertising and reasonable terms, the manufacturers' allowance for his cost of service and replacement can be very little indeed.

Advertising and sales expense: An advertising appropriation is essential in establishing a new business and after your line becomes an asset to the foreign dealer he will be found willing to share more largely in this expense. All sales cost money and foreign sales usually cost more than domestic for actual volume of business; however, considering the desirability of this business, especially that which comes at certain seasons of the year and the elimination of expense of service stations, and long guarantees, I believe it possible to develop a staple export business at no greater cost than that at home, if the expense is spread over the proper period, of time, say two to three years. Beyond advertising and solicitation by correspondence, it is evident that to secure the best dealers and establish a business, which will meet European competition in the future, and develop relations making the extension of terms possible, it will be necessary to have personal representation on the ground.

ADVERTISING RELATION OF FACTORY AND DEALER.

Co-Operation with the Agents Through the Distribution of Publicity and Definite Data.

THE subject of "Advertising—The Relation of the Factory and the Dealer", was discussed in a paper by George J. Rees of the Chicago Pneumatic Tool Company, Chicago, Ill., in which he said in part:

Every one of you manufacturers is eager to push sales through your dealers. You plan carefully. You put the best talent of your entire sales organization at work on that problem. You are after plans, ideas and suggestions wherever you can get them that can be put to practical advantage. You are doing much—you are doing good work—but are you doing all you can?

And it's a fact. No matter what we have done, we can do better than that. This question of dealer help from the factory is a comparatively new subject. There are fresh, keen brains, as well as old, experience tested ones, to be put to work on it. We have precedents—successful, dollar proved plans—that can be utilized, improved and extended—and every one of us ought to make the most of what has been done and what is yet to be done.

Many of you men have been in this business longer than I. You can give me excellent advice and valuable suggestions from your ripper experience, but I think I can speak with becoming modesty of the work my company has done in the field of dealer co-operation.

When our company began the manufacture of the "Little Giant" an advertising appropriation was put in my charge. I knew that money was not a Christmas gift. I knew our directors would expect to see that appropriation appear on the profit side of the balance sheet. They'd look for it at dividend time. And I wanted to make every dollar of it earn.

Helping a man sell motor trucks for you is mighty fascinating work. I suppose I could talk to you all day about the co-operation we give our agents. But I am going to give you only a brief summary. The keystone of the plan is what we call illustrated letters. These are four-page sheets, the first page containing a direct message to the reader; with his name and town carefully filled in in the proper place for the salutation of a letter. The inside pages contain original illustrations picturing some strong selling points. Every illustration must be a graphic, human interest picture that will drive home at once, clearly and vividly, the point we seek to emphasize in that particular piece. The illustrations are backed up with strong sales talk. The effect of the piece is that of a well planned, carefully laid out display ad—plus the direct, personal message which assures the hearing.

Can you see the unlimited possibilities of such a piece of advertising matter—the innumerable purposes to which it can be put effectively? As we have two classes of prospects—dealer and user—we of course have two distinct campaigns. One is the direct agency establishing campaign—the other the co-operative campaign in the interests of the agents. We go to the man who makes money by selling the car and to the man who makes money by using the car, and we find the two campaigns work out in perfect harmony, in many places interweaving.

The agent secured, we set about making him curry his field for prospects with a fine tooth comb. We furnish him with list blanks on which we urge him to write the names and addresses of every possible user of our truck. When this list is secured we begin our bombardment of these prospects. The agent is furnished with copies of every piece in the campaign, with full information about the mailing of them, so that he is constantly informed about what we are doing. He is advised immediately when inquiries or responses of any nature come direct to our general offices. If circumstances arise in which special letters are deemed advisable, the agent is furnished with a copy of all such letters with our reasons for using them. If he asks us for help of any kind he gets it.

These campaigns to prospective users to make sales for our dealers always include a number of the illustrated letters. In some campaigns we have used as many as a dozen of this kind of piece. In addition to these illustrated letters we use plain letters and, of course, our printed matter, such as catalogues, booklets and circulars. Such dealer co-operation means a lot of work to be sure—but it also means a lot of sales—a lot of sales that could not be secured in any other way.

I firmly believe you cannot secure as much for your money in any other way as by sincere, carefully planned and vigorously executed co-operation with your dealers through direct, personal advertising. Such co-operation is bound to be successful because it is founded on plain common sense. The dealer knows his territory better than you ever can know it. The prospective buyers are Tom, Bill and Hank to him. He knows whether Bill Jones could save money by using trucks—and he's right there on the ground to prove that he knows. And the support you give him in educating these prospects counts big in sales. He appreciates your work in getting interest aroused in the men whose names he sends you. You save him time—you make his work easier and quicker. You can reach scores of prospects while he would be working on one without your aid.

Manufacturer Should Plan to Sell Trucks Through the Agencies Rather Than to the Agents.

DEALING with the subject "Advertising Relationship Between Factory and the Dealer", R. P. Spencer, advertising manager of the Denby Motor Truck Company, Detroit, Mich., said the following:

The manufacturer has at his command resources for the securing of definite information in regard to the selling of motor trucks in all parts of the country. Resources which the individual dealer does not have at his command when amplified by the data that the manufacturer can furnish will tend to make a comprehensive campaign for the locality in which the dealer is located. The tendency of all motor truck advertising has been to dwell chiefly upon the mechanical perfection which is being advertised, and while the prospective purchaser is, of course, desirous of knowing that the truck offered him is a perfect piece of mechanism, he is more interested from the standpoint of economy of operation and real utility as concerns his haulage problem.

It seems to me that all of we manufacturers can be more alert to the study of the

peculiar conditions which confront our dealers in the different localities. Advertising and salesmanship is so correlated that it is impossible to divorce them and no advertising campaign for the dealer should be attempted until a thorough and exhaustive investigation has been made of the dealers' possible market and the particular style and kind of advertising best suited to solving of the problem. An advertising campaign that will produce results for a dealer in Pittsburg will not necessarily produce results for a dealer in Boston. It is not a question of how much the dealer is willing to spend for advertising, but how can the manufacturer assist him to spend it wisely.

Dealers have said to me, "advertising does not pay. I placed a few advertisements in the daily papers and nobody has come in and bought a truck". There must be a full realization of the fact that advertising does not push, but that it pulls steadily and that the better it is planned and the more persistently it is carried out the stronger and steadier will be the pull. The usual forms of advertising indulged in by dealers consist of letters, printed broadsides and newspaper advertising, and a great many of them seem to feel that the advertising is simply a necessary evil. They appropriate a certain sum of money and parcel it out to the men who put up the strongest solicitation for the business rather than on the basis of thorough investigation of the possibilities and adaptation of the form of advertising best suited to produce results under the circumstances. Understand me, this is not an unfavorable criticism of the dealers' advertising methods. It is more an unfavorable criticism of myself and brother manufacturers, for it seems to me that we have not been of as much assistance to the dealer as we could be.

A thorough study of marketing possibilities is necessary before an advertising campaign for any particular city can be planned, and the quantity of any particular type of trucks that can be sold in a given community is not necessarily in proportion to the population. Have talked to various territorial managers of truck manufacturers in regard to the sales possibilities in their territories and find that almost invariably the tendency is to enumerate the different cities in the territory according to population and estimate that a city of large population should sell the largest number of trucks, and a city of smaller population a proportionate smaller number of trucks. This is, of course, one angle to figure from, but opposed to that line of reasoning we are confronted with the fact that very often a dealer in a town of 50,000 will sell twice as many trucks as a dealer in a town of 250,000. This would indicate undoubtedly that the dealer in the smaller town is more alive to his possibilities perhaps, but at the same time there may not be any more actual prospects in the larger city for the purchase of that particular type of truck.



**R. P. Spencer, Advertising Manager
Denby Truck Company, Chairman,
General Committee.**

DEMONSTRATIONS—PROPER LOADING OF TRUCK TIRES.

Decreasing Need of Operating to Prove Capacity—Work Done Should Be Fairly Paid For.

DEALING with the subject, "Demonstration—Necessity and Charges", J. C. Ayers, district manager for the General Motors Truck Company, had the following to say in his paper:

I don't believe that by charging you take care of all the evils of the demonstration habit, but if you must demonstrate, if there is no way out of it, I would say by all means charge for the demonstration.

I say that a great deal like the man who says, "honesty is the best policy"—because he has tried both.

In our Detroit branch we began charging for demonstrations Nov. 1, 1912. During the 12 months previous to that time we had made a great many free demonstrations. We had made some demonstrations for which we had charged. We had also made a number of sales talks over a chassis, without any demonstration.

Our records show that during those 12 months we participated in 81 free demonstrations. Out of those 81 we secured but one order. That left 80 concerns to whom we gave free demonstrations that did not buy trucks of us. Out of this 80 there were only four concerns who bought motor trucks—the balance did not buy any motor truck.

In other words, out of our free demonstrations in one year five per cent. of the prospects made purchases of some make of truck, while 95 per cent. were merely getting their goods hauled free at the expense of the truck man.

We began charging for demonstrations, as I have said, Nov. 1, 1912. We kept this up for 14 months, until Jan. 1, 1914. During that time we sold trucks to 87 per cent. of the people to whom we had made charge demonstrations. During that time we did make a few free demonstrations, but our records show that we only sold one truck on a free demonstration during those 14 months.

Since Jan. 1, 1914, or the beginning of this year, we have made but three demonstrations of any sort, so it is safe to say that we are today operating without making any demonstrations. Under this plan of no demonstrations our percentage of the total business secured in my territory is greater than it was during the time when we did demonstrating. So we feel that we did not lose any business by cutting out our demonstrations. As a matter of fact, we can make more money on the same amount of business since our operating expenses are considerably less.

Just to review our own experience in this locality, we have practically three years' comparisons. During the first year, we will say, free demonstrations predominated. Five per cent. of all demonstrations resulted in sales of motor trucks—all makes. During the next 14 months the charging for demonstrations prevailed and in that period 87 per cent. of the people who received demonstrations bought trucks. During the past nine months the no demonstration policy was in force in the same territory and even with the scare of "hard times", "war times", and everything else that went to hurt the business, our percentage of the total business written in the territory is equal to that of any other period.

The free demonstrations are too expensive for the dealer, but if there must be a charge his rates should be enough to cover his investment and upkeep expenses, bearing in mind that idle demonstration trucks and drivers cost him money. His overhead goes on whether the trucks are working or not.

The usual schedule which should be followed when charging for demonstrating is:

- \$8 per day for a 1500-pound truck.
- \$10 per day for a one-ton truck.
- \$12.50 per day for a two-ton truck.
- \$15 per day for a three-ton truck.
- \$20 per day for a five-ton truck.
- \$25 per day for a special lumber job or a job with a dump body.

Variable Conditions for Operation Necessitate Large Factor of Safety in Vehicle Equipment.

DURING his paper on "Proper Load Rating for Truck Tires", Roy Harris of the Firestone Tire & Rubber Company had the following to say:

Load and speed are the two big factors responsible for the rapid break down in solid tires. How many times do we find in two models of trucks, say especially the 1500 and 2000-pound, or 2000 and 3000-pound, that the wheel-base and tread are practically the same. In the majority of cases this would mean a heavy overhang on the rear axle. On the other hand, the manufacturer may increase the tread, or if not, may build the body higher and wider on the same chassis, any of which may bring in some dangers to the tires.

We are often met by the statement, "this truck can't carry capacity load, as we are in the furniture or cooperage business", as the case may be. The operator, and oftentimes the manufacturer, does not take into consideration the fact that in widening the body and building high, the centre of gravity is being materially raised. As the truck passes over a crowned road, the weight of the furniture becomes much heavier on the wheels on the lower side; whereas with a load of much less bulk and with lower centre of gravity the weight on the upper and lower wheels would be approximately equal.

Moreover, in the bulky load, with over half the weight thrown on the lower wheels, the inside of the dual is slightly deformed before the outer tire comes in contact. This probably has some bearing on the fact that in the majority of cases the inside of a dual wears out first and is one reason for our recommendation that dual tires be occasionally reversed. Undoubtedly, for the same weight carried, the tires on a large, bulky load should be larger than those for a compact load.

Wide difference of opinion exists as to proper distribution of weight on the two axles. Approximately 30 per cent. of trucks when empty show more than half the weight on the rear axle; 36 per cent. show an equal distribution on front and rear, while on 33 per cent. the weight on the rear axle is between 40 and 50 per cent. of the total empty weight. This naturally means wide variation in loaded weight. Eighty-five per cent. of trucks examined carry from 60 to 80 per cent. of loaded weight on the rear axle, eight per cent. carry over 85 per cent., and only six per cent. under 60 per cent. loaded weight on the rear axle. Of course, trucks carrying more than 80 per cent. on the rear axle, the majority have an overhang of four feet or more.

Again on speed we find a wide diversity. In the 1000-pound and under class, normal speed varies from 12 to 30 miles an hour with an average of 17.3. Two makes show a difference of 18 miles an hour. In the 1200 to 2000-pound class speeds vary from 11 to 30 miles an hour, the average being 15.7. The minimum recommended speed on the 2500 to 4000-pound is 10 miles an hour and the maximum 20, with the greatest difference seen in the 3000 and 4000-pound groups. In the former recommendations vary from 12 to 20, with an average of 15.8, and in the 4000, from 10 to 18, with an average of 14.5. The speeds of the three-ton group vary from 10 to 18 miles an hour, with an average of 12.4. In the 3½-ton the average is 12, variations being 11 and 15. In the four-ton, speeds range from 10 to 16, the average being 12.6, whereas with the five-ton the range is from six to 16, with an average of 10.3. The speed for the six-ton truck seems to be uniformly 10 miles an hour; the average speed on the seven-ton is 11. From this point the average speed recommendations decrease until we find eight miles an hour for the 10-ton trucks.

We have not considered the style of drive, nature of road, nature of merchandise carried, whether dead weight or resilient, spring suspension, braking, or the driver himself; yet we believe you will admit that the variables are such that only a broad average schedule can be arrived at.



J. C. Ayers, District Manager, General Motors Truck Company.



Roy Harris, of the Firestone Tire & Rubber Company.

CARE OF TRUCK SPRINGS—STANDARDIZED COST FORMS.

Variance of Loading and Haulage Conditions
Impel Careful Use to Insure
Good Service.

"CARE of Truck Springs", was the subject dealt with by J. G. Utz of the Perfection Spring Company, who stated:

In most cases truck makers are attaching the rating plate in a prominent place, cautioning against loading beyond rated capacity, but we all know how these rating plates are disregarded. Again, some truck makers allow for an overload capacity in their design beyond the advertised rated capacity, and when the spring maker is advised of such conditions he is able to accommodate the same in the spring design.

There is danger in letting it become generally known that a given truck is capable of handling a certain overload, as many truck salesmen, in order to clinch a sale, will tell the prospective customer that, while the normal rating is, say three tons, the truck is really designed to carry five tons. This is unfair to all concerned, as the customer immediately considers the vehicle as having a five-ton capacity, and will load up accordingly, occasionally even exceeding this limit. The result is self-evident: all margin of safety disappears and the ultimate life of all parts is shortened accordingly. The next item is the solid tire of the truck that throws additional vibration upon the springs. The frame of a truck is far more rigid than that of a passenger vehicle, which throws the distortion, due to road vibration, upon the springs of the truck. Next, and of great importance, is the distribution of the load.

Speeding is probably the greatest crime that can be perpetrated upon an innocent truck. If a truck is moved along the road at 10 miles an hour under full load, it is more than likely that it will continue to do so for a very long time without exhibiting undue weakness at any point. But if a truck is driven without any load at 20 an hour, remembering that the truck weighs more or less than 60 per cent. of the gross rated load, it is a certainty that that truck will wear out long before it pays for itself in service. It is not believed that the average driver fully understands how detrimental it is to the life of a truck to drive it at high speed when it is empty. The energy stored in a moving mass responds to the rule, which may for convenience be expressed as follows:

The energy stored in a moving mass is proportional to the weight in pounds multiplied by the square of the speed. In other words, if the speed is doubled, the strain is multiplied four times, and the life of all parts materially diminished. In the economical production of commercial vehicles, in view of the present day competition, truck makers are reducing costs wherever possible, and since springs are sold by the pound, they are quite anxious to reduce the weight of the springs.

There is a point here worthy of attention. In the first place, the springs are called upon to absorb and dissipate energy, and there are only two ways in which this energy can be absorbed and dissipated, and both ways are in the form of friction. The two kinds of friction involved are internal and external; the internal being work done upon the molecular structure of the steel, and the other in external friction between the plates. The external friction is small and, with the present unwarranted demand for lubrication between spring plates, little reliance can be placed upon this form of absorption. This leaves the internal friction of the molecules as the only means of absorbing the desired energy. The more energy the molecular structure of steel is called upon to absorb, the sooner its power of absorption will be overcome. Therefore, it is quite evident that the larger volume of steel employed to absorb this energy, the greater will be the life of the springs. It is surely true that a certain amount of energy must be absorbed in the springs, and the more steel the more life. Hence, a reduction of steel means a reduction of life.

It also follows, where the springs are designed with sufficient steel to absorb the energy brought about by the normal rate of load with a liberal factor of safety for overload, that when the normal load is exceeded up to the overload, the factor of safety disappears; and when the load exceeds the overload capacity, the life of the springs will be reduced at an alarming rate.

It should be born in mind at this time that springs and tires are two things on any motor vehicle which must wear out, since they are the only two items on a vehicle that are deliberately distorted in normal service. Fortunately for the truck maker (and unfortunately for the spring maker) springs do not wear out in as short a time as tires, but they ultimately must wear out. And when springs that have stood up to the mark for a considerable time begin to weaken and settle, it is time to replace the entire spring instead of having them "reset".

Resetting of springs is something like retreading a pneumatic tire, or putting a pair of half soles on an old pair of shoes. It is not economy to put a pair of half soles on an old pair of shoes where the uppers are practically worn out. We all know that retreading an old pneumatic tire is of little value, as the carcass is near the end of its life; and for the same reason it is not good policy to reset an old pair of springs, as the molecular tension of the steel indicates that it is near exhaustion when the springs begin to settle, assuming the steel to be of sorbittic micro structure after heat treatment.

Absence of Definite Data a Serious Handicap
Both to Truck Salesmen and to
Prospective Buyers.

REVIEWING the subject, "Standardization of Cost Forms", Rollin W. Hutchinson, Jr., of the Sternberg Motor Truck Company, included these statements:

This can only be done by a concerted agreement to standardize our forms so that the present miscellany of cost charts will be crystallized into one definite cost form, which shall read exactly alike for all gasoline truck manufacturers and one analogous standardized form for all manufacturers of electric trucks. Likewise, each manufacturer of the two kinds of power driven vehicles should issue one and the same cost form for horses and horse trucks. If we do not submit at this time our differences to a court of arbitration and individually and collectively agree, we will continue to flounder around hopelessly and fruitlessly in getting sufficient interest from our users to keep dependable cost records. And until standardized cost forms which admit of a common interpretation for any two makes of trucks utilizing the same kind of power are adopted, there will continue to be no reliable basis of comparison between any two makes, or most important between the cost of horse



Rollin W. Hutchinson, Jr., General
Sales Manager, Sternberg Motor
Truck Company, Milwaukee, Wis.

vehicle and motor vehicle delivery service. One of the greatest deterrents up to this time in popularizing motor trucks in the broad sense of the word has been an almost utter lack of comparison between the economy of animal and motor merchandise service. Until we shall have made it easier for our users to keep dependable cost records, we will continue to encounter a serious selling resistance, because we have not today, except in isolated cases, any sufficiency of dependable cost figures to talk in positive terms of four-point decimals if need be in convincing the stubborn prospect that for a large number of cases the motor truck can more than justify its initial investment on the grounds of a much lower operating cost than the muscular system of transportation.

It is a platitude that not more than two truck users out of 10 keep such figures that the most extravagant-in-promises salesman has the conscience to perpetrate the crime of committing such vague and meaningless figures as the majority of us have accumulated to his prospect for any approximately similar transportation problem. Again, as I have previously said, the informed prospect does not look upon the motor truck industry with confidence when he has made sufficient investigation prior to investment of the cost figures which have been presented him by a half dozen or more salesmen of competitive builders, and has discovered that the tabulation of any two sets of figures is more or less widely different and their interpretation incomprehensible and meaningless to him for even an approximately similar transportation problem.

In a year or two after the adoption of standardized forms we should have individually and collectively acquired so much definite, dependable, decisive and destructive to the horse habit information as would enable each one of us to go before the hard-headed prospect who himself has never kept the vaguest kind of cost records, yet is so unreasonable as to expect us to have acquired a vast amount of cost affidavits, (when he knows that his practise is the common one of all business houses) and present comparative horse and motor truck figures which will not only be convincing and forceful proof of our claim, but also decrease our individual selling resistance. The problem of cost figures will resolve itself into our ability under the same conditions to better the figures of competitive trucks operating under precisely the same conditions, thereby enabling the prospect to decide which make he will buy the second time and which he will standardize for his transportation equipment. In this way there will be no claims and counter-claims based on extravagant guess work, quibbling and distortion as at present, because we have made it so difficult for the prospect to keep records as we would have them, that we cannot blame him for mistrusting most of the claims we make for economy of motor trucks over horse trucks.

FACTORY GUARANTEES—STANDARD SIZES OF TIRES.

Makers Should Make Provision for Replacing Defective Parts to Lessen Burden Upon Dealers.

"FACTORY Guarantee and Service to Owners", was considered by J. H. Thompson, of the Thompson Auto Company, Detroit, Mich., who said:

Personally, I believe that the subject of factory guarantee is one of the most important that confronts the manufacturers and dealers in the marketing of motor trucks. I also claim



John H. Thompson, Thompson Auto Company, Detroit, Mich., Chairman, Dealers' Committee.

that it is wrong because of the fundamental principle on which the guarantee furnished by the manufacturer is based, namely, a legal limited liability instead of an unlimited business asset. It makes it impossible for the dealer or the manufacturer to live up to it. The guarantee as it stands today is no guarantee at all, but is more of an excuse or reason which is given to the purchaser of a truck to appear in court with the manufacturer if necessary.

We are all familiar with the guarantee used by most of the truck manufacturers. They warrant their product to be free from defects in material and workmanship for a certain period under normal use and service. They agree to furnish, free of charge, any parts that are returned to their factory, if in their judgment the part is defective and if the truck has not been subject to misuse, negligence or accident, or has not been operated at a speed exceeding the factory rated speed or load beyond the factory rated load capacity.

Now, gentlemen, if you will stop and consider what this warranty means you can readily see that the dealer, as well as the owner of the truck, is in the hands of the manufacturer. What chance have we when the factory depends entirely upon the judgment of its inspectors and service managers, who are naturally working for its interests? In cases where parts are presented for inspection and are found to be defective by the manufacturer, we are presented with the parts gratis and are expected to gratefully thank the manufacturer for his leniency. No mention at this time is made in regard to the charges for the installation of the defective part. That is ignored by most manufacturers and left entirely to the discretion of the dealer as to who is to pay the labor charges.

Service, as applied to the moral obligations of the manufacturer or the dealer, to purchasers of motor trucks should consist solely in the willingness and ability to supply renewals and parts at a fair price and without delay, and also in acting in an advisory capacity regarding the care and proper application of the motor truck equipment. In special cases service may also include the hire, at standard price, of one or more dealers, demonstrating or service trucks that he may keep for use in his own business, or for renting purposes, so that his customers will not suffer unduly while their motor trucks are laid up for overhaul or repair. This, however, is a business accommodation, and should be paid for as such, at prevailing prices. It is not service that is included in the purchase price of the motor trucks the dealer has for sale. Service does not include free renewals or worn out or broken parts, except as provided for in the manufacturer's guarantee.

Gentlemen, if you are in position to give the proper kind of service, your customers as a rule are willing to pay a reasonable charge for it.

In order to give your manufacturers the proper kind of representation, it is absolutely necessary for you to carry a stock of parts, as you are well aware of the inconvenience your customers have to contend with when it is necessary to lay up their trucks to await the arrival of certain parts from the factory.

Looking into the service end of the motor truck business we find that the reputable dealer who places himself in a position to render good service is confronted with inducements by his competitors, such as free service, which he is unable to compete with. Gentlemen, free service to purchasers of motor trucks has never been, to my knowledge, successfully handled by any reputable truck dealer.

Standardization to Minimize the Expense to the User by Developing the Most Useful Equipment.

IN THE course of an interesting address on "Standard Tire Sizes", J. E. Hale of the Goodyear Tire & Rubber Company stated:

Now the question, what are the possibilities of further standardization? The development of the solid tire industry has been essentially a process of evolution and elimination. We can apply no theories nor formulae to our tire problems—judgment backed by experience is the prime essential in conducting this business successfully. Consequently, it is easy to appreciate the reticence of the various tire manufacturers in the matter of yielding to any proposals which might demand a departure from their established practise. However, it is the writer's belief, after having struggled through several years rich in instructive experience, if not in profits, that the solid tire of today has been worked out, so that the fundamental principles of tire design and fabricating methods have been established, which means that the prospects of standardization should be much more favorable now than formerly. The subject of carrying capacity offers a chance for standardization work.

Each tire company guarantees its tires to give a certain performance in service when not loaded beyond a certain limit definitely specified in its published list of carrying capacities. There is a variation in the lists used by the various rubber companies. This works out inconveniently as follows: A truck builder in designing his trucks plans to use as standard equipment, say a five-inch tire of a particular make which he finds suitable to carry the load after consulting the table of carrying capacities furnished by the tire manufacturer. Presently occasion arises which compels him to substitute another make tire, and if the range of carrying capacities is lower than pertains to tires of the first company he will likely find that a five-inch tire will not carry the load which necessitates the trouble of providing six-inch wheels.

The same condition applies after a truck has been sold. The user wants to try another make of tire and finds he is obliged to rebuild his wheels to the next size larger. All of which totals up as unnecessary expense which must be paid for by the industry in general. Now there is an economical load for each size of tire. Since the total mileage given by a tire is less the more load the tire carries, in deciding on the proper rating, we should first have reliable information on what mileage could be expected from a tire when it carries different loads in service.

Given a load, say 2000 pounds, what is the most economical tire to carry the load? Suppose we test for and tabulate the proper data as to the mileage tires will give under different loads and we find that with a 3½-inch tire carrying this 2000 pounds the cost per tire-mile will be \$.003½, with a four-inch tire \$.002¼, with a five-inch tire \$.001½, with a six-inch tire \$.001½, with a seven-inch tire \$.002, it is evident that the six-inch tire is the most economical tire to use to carry this load.

The S. A. E. last winter suggested the adoption of a standard list of carrying capacities, arguing that its accomplishment would simply mean that all the tire companies would use the same list and would simply have to accommodate their design and compound so that the tires would carry the load. The matter of actually formulating a standard shortly disclosed the absolute necessity for reliable figures on the wear of tires under different loads before any intelligent progress could be made along such lines; and since the required data were lacking the work presently came to a stand still.

It happened that from some time previous the company with which the writer is associated had contemplated a revision of its own list of carrying capacities. Realizing the importance of reliable data as a guide in formulating this new table it was finally decided to institute some authoritative tests under actual service conditions and settle the thing once for all.

The Troy Wagon Works of Troy, O., being desirous of making certain tests on trailer work, was kind enough to loan us two trailers in return for the privilege of making tests of their own. These we assembled in a train as shown in the view on the screen. Both trailers were equipped with 36x4-inch tires all around. One axle carried no load except the chassis and body weight, the next a considerable overload and so on. The train makes 50-60 miles a day on average roads in Akron and vicinity, and since the tires follow in each other's tracks and travel at the same speed, it is fair to assume that if one tire wears faster than another, it is due to greater load which it carries. At the present time we have covered nearly 2000 miles, and while we must cover several times this distance before the test is completed, the results already obtained are so interesting that we are glad to show them. It is gratifying to us to be informed that the truck standards committee of the S. A. E. considers this test authoritative enough to await its completion before deciding the matter of carrying capacities. With the completion and acceptance of this standardization of carrying capacities, the industry will enjoy the benefits of one more substantial step in the cause of truck operating economy.

TRUCK BODY WEIGHTS—TRAFFIC ENGINEERING.

Bodies Adapted for the Chassis and Not Over-Rated in Weight Necessary for Economical Service.

THE following was included in the paper, "Evils of Overloading and Over-Rating of Trucks, and Permissible Body Weights", read by Chief Engineer F. A. Whitten of the General Motors Truck Company:

The manufacturer who over-rates his truck is committing business suicide. The salesman who misleads a customer regarding the capacity of a truck is making trouble for his company. While truck salesmen are, as a rule, of a high type, they are also as a rule enthusiastic, anxious to please, and still more anxious to capture the order.

We find salesmen who will recommend their truck rated at $3\frac{1}{2}$ tons capacity to safely carry loads of five tons. They do so because the purchaser thinks he may have an occasional heavy load, or because they find the customer unwilling to pay the price of a five-ton truck; and the salesman does not want to lose the order.

Unless some agreement can be made as to ratings we will continue to have misunderstandings of this kind. In the first place, how is the engineer to determine tire sizes, spring capacities, and the multitude of other details, if he does not know what the truck is expected to handle? It does make some difference in many ways whether the pay load is to be 7000 pounds and whether the body is to weigh 1000 or 2000 pounds. The designer must provide for a certain safety factor over any nominal load capacity, and this percentage has to be added to the overload capacity, as well as to the nominal load capacity, if it is to carry the overload safely.

If the truck in question is to be designed throughout for a 10,000-pound load, it is obviously unfair to sell it to the purchaser who needs a truck of only 7000 pounds capacity—unfair because of the greater first cost and the greatest operating cost, both of which are unnecessary. In other words, if the truck will safely carry one or two tons more than it is rated, then it should take a higher rating.

The adoption of standard body weights by the National Automobile Chamber of Commerce some time ago was a step in the right direction. While manufacturers generally have used these weights, not enough emphasis has been laid upon them. Whether these standard weights are just what they should be is of little consequence if all manufacturers will only use them and stick to them.

On an electric truck the question of body weight is of greater importance to the manufacturer than on the gas truck. The mileage rating for any such vehicle may be materially affected by a very heavy load. It is our practise to specify on all contracts that the rating is for a definite load and with a maximum stated body weight. Purchasers should not be allowed to put bodies of any length they please on chassis. An extremely long body with great rear overhang may greatly change the intended load distribution with disastrous results for the rear tires, springs, etc. The body application should really be OKed in every case by the manufacturer when the order is accepted.

There are trades where a body has been developed by long experience and proven to be the best for the purpose and practically the only one which will stand up indefinitely; but this body may be much heavier than any standard body weight allowance for a chassis having the nominal load capacity for which the body itself is designed. For example, this might mean that a three-ton chassis must be used for a two-ton load. Unless all the circumstances are looked into, the manufacturer may easily make a mistake under such conditions in selling a two-ton chassis, merely on the strength of the purchaser's assertion that his load will be two tons.

It is my opinion that the load capacity and the body weight allowance should appear, not only on the name plate of the truck, but should be specified in the order. As an additional safeguard against the enthusiasm of the salesman, there should be a warning in bold faced type just above the much talked of "dotted line", warning the purchaser not to sign the order, unless all of the promises and guarantees made by the salesman are written in the order. This would avoid future disputes between the owner and the manufacturer after the salesman who took the order was no longer connected with the company.

In fact, there would be no reason for disputes, for the salesman would scarcely dare write anything in the order that was not authorized by his company; or if he did, and it was wrong, the order would not be approved.

As a further precaution the body weight allowance should also appear on the body builder's blue print of the chassis when the customer has the body built outside of the truck manufacturer's plant.

I believe that among truck owners there is a general misapprehension in regard to overloading, for they seem to think that an occasional overload does no harm. This is not true. If the weight is enough to tear tires loose from their fastenings, or bases, one overloading is enough to do the damage. If the rear axle is bent, it is permanently weakened, for the elastic limit of the steel has been exceeded. If bearings are sufficiently overloaded they suffer permanent injury. These results unfortunately are not always immediately apparent.

Factory Department Must Collect Data for Use by Salesmen and Those Buying and Operating Trucks.

ESPECIALLY interesting was the paper on "Traffic Engineering", by E. L. Schumacher of the Denby Motor Truck Company, which was in part:

The motor truck industry in its present state is nothing more than a healthy infant, and if it ever hopes to develop into boyhood and then manhood, it must undergo some improvements in at least two directions: First and most important of these is along the line of motor truck selling. Second and next important has to do with motor truck operation, and it is in these two lines that the traffic engineer is the "efficiency doctor".

Now here you have the entire sales problem boiled down into one statement. A motor truck is a hauling machine which is to compete with the horse drawn vehicle and which is to be sold to business men as an investment. Now we know the sales problem, how are we going to solve it? The first step in selling any machine to a business man is to reach him and interest him. How is this to be done? It can be done in two ways, viz.: First. By properly advertising. Second. By supplying



E. L. Schumacher, Traffic Engineer, Denby Motor Truck Company, Detroit, Mich.

dealers and their salesmen with reliable, accurate and undisputable data, carefully collected from all the various lines of business which the truck is designed to fit. By proper advertising is not meant advertising the chemical properties of your springs and axles or the horse power, bore and stroke of the motor, but it means advertising the service value of the truck and economies to be effected by its installation.

Right here is where the traffic department must start. It must collect the data which should form a basis for all advertising and furnish the dealer and his salesmen with the ammunition which should not only interest the prospective buyer, but make him ask for an investigation of his own delivery equipment. After we have reached and interested a customer, what is the next step in selling a machine? Why the next step naturally is to show him that it will be a profitable investment for him to buy. This can only be accomplished after the salesman knows such facts as: What is the present equipment doing? What does it cost to operate and maintain it? Can it be improved in any way? What can the motor truck operating under these conditions do? What will it cost to operate and maintain trucks working under these conditions?

Such facts can only be learned after a thorough investigation has been made. A very large percentage of firms think they know what their delivery equipment is doing and what it costs, but actually a very small percentage knows. Therefore, a motor truck salesman must be a transportation man, capable of analyzing conditions, comparing costs, accurately figuring savings and correctly advising the proper installations. In other words he must fit trucks to the business and not permit the business to be fitted to the truck.

Now after the average business man has been interested in a machine and convinced that it will be a good investment, there is still one point he must be convinced of. He must be convinced there is no better machine on the market from the standpoint of price, adaptability and economy. Here again it is up to the salesman and he must know his product. This does not mean he must talk transmission, magneto or wheels, but it does mean that the buyer must be convinced that the cost per mile of operating and maintaining the proposed truck will be a minimum, and that it will be the proper capacity and design for his particular requirements.

This is nothing new in selling machines. I don't believe there is one type of machine, excepting the motor truck, which is not sold as just described. Take for example the gas producer, steamer engine, locomotive, machine tool; before any one of them can be sold the purchaser must be shown: First. That he needs one. Second. That it will be a profitable investment. Third. There is no more profitable machine on the market. These are the fundamentals of selling.

EVILS OF OVERLOADING—DEVELOPING DRIVERS.

Over-Rating a Prolific Cause of Abuse of Vehicle Efficiency Dependent in No Small Measure on Consideration Given Their Employees. Men Handling Them.

A PORTION of the paper on "Evils of Overloading", by H. M. Alden of the Timken-Detroit Axle Company was as follows:

Why are trucks overloaded? For two reasons: First, ignorance of the consequences; second, deliberate disregard of the consequences. What are these consequences? Briefly, disaster to the truck, dissatisfaction for the user, trouble for the maker.

Over-capacity is an absolute necessity. Putting it in engineering parlance, we must have a factor of safety. That is, every part and piece must be somewhat stronger than is necessary to do its work under ideal or even ordinary conditions. Because there will be times when that factor of safety will be necessary. One pound over $1\frac{1}{2}$ tons will not break the back of a $1\frac{1}{2}$ -ton truck; neither will 10 pounds, 100 pounds or perhaps 3000 pounds. Its motor can develop more power than it normally needs to move $1\frac{1}{2}$ tons of merchandise. Its axles, bearings, frame and other fundamental parts have reserve strength. That reserve strength is for emergencies—not for every hour of the day use.

No truck should be over-rated. This is the "sales" stage and here is where a great deal of damage has been done to the trade consciously or unconsciously. While over-capacity is a necessity, over-rating is nothing short of a crime. I say crime because it is perpetrated by men who ought to know—by the maker or the seller of the truck, and crime because it is bound to bring a disastrous experience to the user that naturally prejudices him against the motor truck he bought and against motor trucks in general.

Nothing is more harmful to the motor truck industry than over-rating. It reflects not only on the manufacture, but on the industry as a whole. No truck should be regularly overloaded. This is the "use" stage. Here ignorance and indifference are the two causes, both resulting from the scramble for the "almighty" dollar. The truck is essentially a money earner, or saver (which is the same thing). Hence, the desire to get all there is to be had. Thank heaven, all trucks are not operated on this basis or there would be no truck business left. But there are enough of them so operated to have seriously restricted the enormous field possible. While the situation is undoubtedly improving, it is still bad. Those who know about these things must teach those who don't know and must fight those who know and don't care.

First, as to the crime of over-rating. At one of the great truck shows last winter I tabulated the weights and prices of 12 trucks that were rated by their makers at $1\frac{1}{2}$ tons. They varied in weight from 3750 pounds to 5700 pounds. Now, if the truck that weighed 5700 pounds is a $1\frac{1}{2}$ -ton truck, does anyone here believe that the 3750-pound truck is also a $1\frac{1}{2}$ -ton truck? Without doubt each of the 12 can carry $1\frac{1}{2}$ tons without breaking down. The question is how long can it do this, and the further and more important question, what will be the comparative repair and upkeep expense over a period of years?

I think we will all grant the practical impossibility of officially rating the capacities of all makes of trucks by an independent board of engineers. I doubt if there is a maker here represented who would approve of such a suggestion, but we can perhaps establish a rule that each maker shall publish one and only one capacity rating for each of his chassis, and after deducting the weight of the body that goes on the chassis shall mark that rating permanently where the driver can always see it. Such a plan would help to keep over-anxious salesmen from exaggerating the capacity. This done, the actual performance of trucks having the same rating would settle in the public mind their relative values.

Overloading must be attacked in two ways—teach the public who do not know the fatal results of persistent overloading and fight the man who does, but continues his pernicious practise. Here, too, we can do by combined action vastly more than we can possibly do by acting singly. Through the trade press, upon whose hearty co-operation I am sure we can rely, we can everlastingly pound out the truth that overloading does not pay. We can preach this gospel over many signatures, from many viewpoints and in various ways.

We can, as an association, publish a booklet or pamphlet setting forth in easily understood language the evil effects sure to follow the practise of overloading. We can explain for example, "elastic limit" and picture by micro-photographs why it should not be exceeded. We can popularize the term "fatigue" until it seems as real as it actually is, and the driver gets the truth that steel, as well as horseflesh, can suffer from this dread disease.

We can co-operate in the distribution of such a booklet. We can publish instructions on the care of commercial cars; we can impress upon heads of concerns the necessity of knowing that their employees in charge of trucks give them reasonable care and do not overload them. There exists in the world today only a minute fraction of the commercial cars that can be profitably run if wisely sold and rightly used, and the blame for this condition rests upon our shoulders. We must build trucks right, sell them right and see to it that they are rightly used by the ultimate owner.

THE following was a portion of the paper on "The Driver's Relation to Successful Motor Truck Operation", by C. P. Cary of the Federal Motor Truck Company:

A salesman would inform a brewer that he could deliver 50 half-barrels from his New York brewery to Coney Island with the new electric truck, but the demonstrating driver could only return to New York by getting his truck upon the street car track and letting the street cars push it up Third avenue to the brewery.

Another salesman would promise to deliver a five-ton load of beer 60 miles down the island with a new gasoline truck, and the driver, in order to get back the same day, would have to overspeed the truck, getting it out of condition and be laid up for repairs the next day.

A shipping clerk who favored some salesman and wanted his truck installed, would route his demonstration the shortest possible mileage and instruct the helpers to rush their deliveries so that should this salesman secure the order, there was no alternative for the truck driver but to maintain the speed established by the demonstrator and a tired driver with insufficient time to care for his truck, resulted in trouble for the owner, the truck and himself.

There were instances where goods were held back from loading points until after the truck had made its pickup, then the goods were put on the loading platform and somebody would notify his superior that the truck was not doing the work as well as horses had done it previously. Many incidents as above cited occurred during the early development of the industry, and retarded the advance of motor trucks greatly.

When the writer visited some of the early purchasers of motor trucks, several years ago, nearly all had better comments to make regarding the vehicles and help secured to operate them, and in many instances had laid their trucks up and instituted animal haulage. Those vehicles were serviceable, and when put into work suitable for them, operated by intelligent drivers, gave very satisfactory results.

Recently at Norfolk, Va., the writer saw a vehicle in service, which seven years ago laid in the back yard of a wine distillery because satisfactory drivers could not be procured. At the time this vehicle was sold, very little knowledge of motor trucks had been gained by owners and drivers, and when the writer first visited the distillery this vehicle had many battery leads with the insulation torn away and upon which bare places the driver had put on a coat of vaseline, having been told that this was a good insulator.

That truck is now driven by an intelligent fellow and considering the vintage of this model, is giving very satisfactory service. With the commercial vehicles of the present time, less attention is required and drivers may be secured who can satisfactorily operate them without expert knowledge.

The tendency now is toward securing for heavy truck drivers, strong dependable men, who will handle much tonnage in a day. Such drivers are usually selected from those driving horse vehicles. For light delivery vehicles, young, active fellows of good appearance are selected, and who make a favorable impression upon the firm's customers.

In any event, vehicle operators should be men who will keep the vehicle moving, the maximum of time and appreciate that they must tupe themselves up from horse speed to truck speed. It has been clearly proven that owners driving their own vehicles, operate them at a lower maintenance charge than hired help. This is because the owner is conscious that his investment will be best served by careful loading, driving and lubrication. He keeps his vehicle at all times in good condition, and appreciates that the faster he works the greater mileage and tonnage resulting and obviously larger earnings for himself.

This is the era of good roads and rapidly improving streets, better loading and unloading facilities, practical truck equipment and a working knowledge of truck application. There are to be found in even the small towns, men trained in the general repair of modern commercial vehicles. Such men can adjust and operate motor trucks satisfactorily.

Commercial vehicle education is rapidly overtaking horse knowledge and successful installations are to be found on every side. Owners and drivers should consider their commercial vehicles as carefully as horse vehicles and give them the proper consideration and treatment. They should be garaged where there is good light, heat and adequate arrangements for washing and adjusting the vehicles. The driver should have ample time to properly lubricate the vehicle each day and time should be allowed for making necessary adjustments to keep it in good condition at all times.

Adjustments of an important nature are frequently authorized by the owner to be made by the driver, believing it to be an economy by saving the charges of a service man, but the average driver of today is competent to make only minor adjustments, and he frequently does the wrong thing. He reminds one of the fellow instructed to look for spavins and as a result purchased a blind horse. The driver should not be required to do important repairs on trucks unless he is competent.

TERRITORIAL LINES FOR DEALERS—TRUCKS ON FARMS.

Agencies Should Be Established to Give Greatest Results from the Areas Dealt With.

Large Possibilities for Development of the Rural Use of Machines from Economic Needs.

"TERRITORIAL Lines for Dealers", was the subject discussed by T. P. Lippard of the Stewart Motor Corporation, in the course of which he stated:

Apportioning territory to dealers with the exclusive right to sell trucks therein has not had as much study as it should receive from the majority of manufacturers in the truck business. In fact, most of us have done considerable injury to the truck dealer and to our own individual business through the lack of such study.

In the past it seems to have been the policy of most truck makers to give the dealer about as much territory as he desired, providing it had not been assigned to some other dealer. It has been natural that the dealer should take all he could get, not realizing that a large territory is really a handicap and a disadvantage because it cannot be properly worked.

The desire of the dealer for large territory is easily understood. First, he has figured that perhaps the factory advertising would bring him in some business from the outlying points, and that would be easy profit. Secondly, he has had in mind the methods of the pleasure car industry—namely, the controlling of a large territory as a distributor or general agent, and the "spotting" of sub-dealers at various points throughout the territory.

Both these assumptions, I believe, are based on a wrong idea of the truck business. Selling a truck involves more than merely taking a man's money and delivering the truck to him. It involves that much-abused word "service" (which I trust will be fully discussed in other papers). Trucks sold by the dealer in outlying parts of his territory are not likely to receive the service necessary to keep the owners satisfied.

The second assumption—that trucks can be properly handled by sub-dealers working under distributors—has also been found to be impractical. The truck dealer, in order to be successful, requires a certain amount of education and training, which can come only direct from the factory. Distributors who have attempted the placing of sub-dealers have generally found the proposition not successful. They have placed the sub-agencies and perhaps sold one or two trucks, but sooner or later they have found that the sub-dealer could not and would not take care of the territory as it should be cared for. Where the dealer tries to work a large territory himself, it has been found that the time and money spent in travelling such a territory is wholly out of proportion to the returns.

All of this convinces me that the only proper way to market motor trucks is through limited territories intensively worked. Many dealers have learned by hard experience that the time and money spent in travelling a large territory would produce greater returns if spent in the immediate vicinity of the dealer's headquarters, whose prospects can be easily worked, and also where prompt service can be given and all owners kept satisfied.

It is my opinion that a dealer taking on a truck, no matter how well financed or established, cannot profitably work a territory larger than a 50-mile radius from his service station. If he will thoroughly work this territory and get a number of his trucks operating in it, he will then have a nucleus on which to expand.

This method is most profitable from the standpoint of service, as well as sales. Not only can the prospects be reached at less cost, but such service as is necessary can be given at far less cost where the trucks can be brought to the dealer's station than where it is necessary to send a man out on the road to look after them.

If a truck is sold at some far distant point from the dealer's service station, he cannot afford to send a man or give proper service. In many cases the attempt to handle such business has resulted in a dissatisfied owner and has hampered the business for that particular truck in its immediate vicinity. The truck gets a bad reputation, which is bound to reduce the amount of business that a factory or dealer can get from that vicinity in the future—not to mention the injury done the truck business in general.

The fault of the dealers having too much territory in the past can be laid at the manufacturer's door fully as much as at the dealer's. Over-zealous sales managers have been possessed of a commendable ambition to cover the whole country. But instead of limiting the dealer's territory to the county, or counties, immediately surrounding his headquarters town, the sales manager has been inclined to let each territory extend out in all directions until it came in contact with the similarly extending territory of neighboring dealers.

In other words, sales managers have sometimes been afraid of having open or unoccupied territory. In my judgment, the manufacturer should resolutely limit the territory awarded to any headquarters town. He should not be afraid to have his sales map of the country show plenty of open space between the dealers' territories.

Instead of trying to cover the entire country, selling a truck here and there, he should pick out his best centres, concentrate upon them, help the dealers to expand and really make money. Then the truck business will increase with greater rapidity.

IN HIS consideration of "The Use of Motor Trucks on Farms", D. F. Poyer of the D. F. Poyer Company, Menominee, Mich., included the following statements:

The speedy transportation of fruit, garden truck and live stock, is a live question wherever there is efficient farming being done, notably nearer the great cities, where the call for delivery is most imperative. In Michigan, during the fruit season this year, the motor truck has been thoroughly tried out, and the experiment, if it can be called such, has been a convincing demonstration of its value and utility. Greater ease and lower cost in transportation have in every case resulted from its adoption—two important points in the production and distribution of products insisted upon in every undertaking. Without the use of two powerful trucks, running regularly from the orchards to the central dock in Benton Harbor, the effectual handling of the fruit would have presented a serious problem to Michigan farmers in this year of bountiful harvests. Transportation companies are coming more and more to realize the necessity of going out to get the freight in communities where the farmer is not equipped to meet their competition. By means of the gasoline cart they are able to drive out and get it, and haul it to the dock cheaper than the slow-going farmer is able to do the same work. There is now all through the fruit region a well defined movement to substitute the motor truck for horse power. And hand in hand with that movement goes the systematic effort to improve the public roads. Another point the fruit farmer cannot afford to overlook, is the fact that where the motor truck is used as a carrier of perishable food products, not only is there a great saving in time, but an added value in the quality of the goods. The amount of waste and loss that result when food products are exposed for hours to the heat of the sun, as is unavoidable in the old method of hauling by horse drawn vehicle, can hardly be computed. And it is the farmer who pays for most of this waste.

To the gardener, the speedy and efficient truck is a boon. A gardener who has tried it, does not hesitate to declare that the amount of time saved practically equals in value the work of a good man. And it is not necessary for me to point out difficulties and vexations that a country man has to face every year in the matter of getting labor during the busy season.

The facility with which he can market his goods by the help of a truck, enables him to increase his output immeasurably. Instead of one tedious trip to town, he can easily make three or four and sell all he has. In many cases the gardener will make enough during the season from the sale of stuff that would otherwise go to waste, to pay for this truck. I know of one man who says he lets \$700 or \$800 worth of celery go to waste because he hasn't time to market it.

Experience has over and over again demonstrated that the motor truck appears to best advantage when compared to a horse drawn vehicle, in comparatively long hauls. Thus the farmer located miles from his market is especially in a position to benefit by the up-to-date transportation; and this is doubly true if the section is one of those progressive communities that have built good, hard roads. Too much stress cannot be laid on the vital importance of good roads, and everyone should urge this point. Good roads are undoubtedly one of the great factors in the wealth of the community.

If a truck on poor roads can carry a ton at less cost than a horse drawn vehicle, with a good road it can carry a larger load and cut down the running time, thus materially reducing the cost of hauling. Furthermore, good roads assure the possibility of getting produce to market in spite of unfavorable weather. A farmer to get best prices for his product must be able to get it to the right market at the right time—a difficult undertaking during a part of the year where he depends upon his horses. Inclement weather naturally retards shipments from primary sources where the demand is likely to be equally as good as the other times. Thus the farmer who can deliver the goods at the market point in spite of bad weather is apt to secure even better prices than ordinary. He is profited by the lower cost of moving under favorable conditions and by being permitted long hauls to profitable markets that could not be reached by horse drawn vehicles under adverse circumstances.

It is unfortunately true that good, hard roads are by no means general in farming districts, but if a heavy road is difficult for a truck how much more so for the horse and wagon! A truck can be constructed heavy enough and strong enough to meet the wear and tear of the most vicious road, without taxing the capacity of the power. The capacity of the best spin of horses and the vehicle they draw must be always light enough to allow a reasonable load in addition.

The manufacturer cannot overlook the farmer as a customer. He is a satisfactory buyer in all respects and takes good care of his machine. He has personal charge of its handling and repair. He uses better judgment in loading it and in managing a heavy load. The traffic conditions in the country are also in his favor. He has a long, straight drive as a rule, and his clutch and brake are not overworked, as they are bound to be on the crowded city streets, thus the wear and tear of his machine is materially reduced.

AUTOMOBILE ENGINEERS TO MEET.

The 1915 annual meeting of the Society of Automobile Engineers will be held, as previously, in New York City during the motor car show, next January. The programme of the meeting contains many subjects for inquiry, discussion and reports concerning or relating to motor trucks. Briefly, the work which will be taken up is as follows:

- 1—Reduction of the number of stock sizes of roller bearings.
- 2—Standardizing of side-outlet carburetors, if thought advisable.
- 3—Revision of S. A. E. felloe band standards with a view to making some sizes thicker, where complaints of their being too thin have been received.
- 4—Standardizing of electric industrial trucks, to be undertaken by T. V. Buckwalter, C. E. Fahlm, J. E. Hale, A. H. Gforer and H. G. McComb.
- 5—Submission of data on steel.
- 6—Standardizing of lock washers.
- 7—Standardizing of tap drill sizes.
- 8—Formula for road destructive work of vehicles.

PIGGINS COMPANY REORGANIZATION.

A plan of reorganization is being perfected for the Piggins Bros.' Motor Truck Company, Racine, Wis., and it is expected that operations will be resumed about Nov. 1. This concern went into bankruptcy last year, and its equipment was sold under the hammer to the Badger-Packard Machinery Company, Milwaukee, but most of it has been repurchased and is being installed in the old plant. It is stated that the company has secured ample financial backing.

NEW DISTRIBUTION STATIONS.

The New Departure Manufacturing Company, Bristol, Conn., has established the following new distribution stations: The Ahlberg Bearing Company, Los Angeles, Cal.; the Chapin Company, Calgary, Alberta, Canada, and the Western Rubber & Supply Company, San Francisco, Cal.

TO MANAGE ST. LOUIS BRANCH.

N. F. Sutton, who has been with the General Motors Truck Company, for several years, has been appointed manager of the St. Louis branch of that company.

The secretary of state of Connecticut reports 26,811 automobiles are registered in that state, which is a gain of 4571 when compared with a total registration of 22,440 in 1913.

The Chicago Gear Company, Chicago, Ill., has increased its capitalization from \$10,000 to \$30,000.

MIRRORS FOR NEW JERSEY TRUCKS.

Commercial vehicles not equipped with mirrors which will permit the drivers to see the road behind them, will be refused renewals of licenses for 1915 in New Jersey. Commissioner Lippincott has decided to adopt this policy because of repeated complaints received from motorists, who claim that heavy commercial vehicles do not allow them sufficient room on the road to safely pass them. This is generally believed to be due to the noise of the trucks preventing the sound of the pleasure car horns being heard; also that the general construction of trucks prevents the driver from seeing anything in the rear.

FAFNIR COMPANY TO SELL DIRECT.

The Rhineland Machine Works Company, New York City and New Britain, Conn., states that since a part of its business, which covers the importation of Rhineland and R. F. B. ball bearings, is so greatly interrupted by the European war, it has arranged that the Fafnir Bearing Company, New Britain, Conn., will market its product direct from the factory.

The Rhineland concern has been acting as selling agent for the Fafnir Company. D. D. Davis, Chicago manager of the Rhineland Company, will make his headquarters at New Britain, and take charge of the sales of the Fafnir Company.

BLANKET TRUCK INSURANCE.

A single policy giving the motor vehicle owner full coverage for fire, theft, public liability, property damage and collision, has been arranged by the agreement of the Home Insurance Company of New York City and the Fidelity & Deposit Company of Maryland. The arrangement will take effect Jan. 1, 1915, and the joint policies will be issued by the agents of each company.

FEDERAL CONSOLIDATION.

The Federal Truck Company of New York, New York City, has been taken over by the Federal Motor Truck Company, Detroit, Mich., and will hereafter be operated as a direct branch of that company.

W. R. McCulla, who has been with the Packard Motor Car Company, Detroit, Mich., for several years as assistant research engineer, has resigned to become assistant chief engineer of the Knox Motors Company, Springfield, Mass.

B. Hewitt has joined the sales staff of the United States Tire Company, New York City, and will have charge of the commercial vehicle tire department of that company.

HOW UPKEEP ELIMINATES DEPRECIATION.

Combination Vehicle Equipment of 138 Motor Wagons and Trucks Used by Gimbel Brothers' Department Store, New York City, Is Kept to High Standard of Service Efficiency by Intensely Practical System of Maintenance.

TRANSPORTATION efficiency can only be obtained through the systematic and carefully organized use of equipment. When vehicle units each represent a substantial investment, good business judgment demands the use of the fewest number, not only for the initial expense, but for the cost of maintenance. The larger the department the lower should be the expenditure for each vehicle unit of a given class. For this reason the actual operating cost ought to be materially less with a large service for a given work, taking tonnage, package or any other basis that may be convenient.

Stock haulage and delivery are immensely important for any business enterprise. The stock must be placed in the stores and warehouses and the greater part of it sent to the purchasers. Few people realize the enormous cost of delivery to the people of United States, for Americans demand more than do Europeans of store and shop keepers, and while not usually made a separate charge expense of delivering is included in the prices paid.

The department store of Gimbel Brothers, at Greeley square, New York City, is one of the largest of its kind in America. Measured by retail patronage it is probably the first, for it is stated to do a business aggregating \$20,000,000 annually. The greatest part of its custom is within a comparatively short distance, Greater New York and the towns and cities within a radius of about 50 miles. Delivery is made first by the company's own vehicles, by express companies and by parcel post. Wherever the conditions justify the company makes deliveries direct, and where the vol-

ume is not sufficient the other means of distribution are used.

The delivery problem has been carefully studied and the company's service has been developed to meet requirements. The zone system was adopted, this including a direct delivery from the store within a definite radius, and beyond this a number of distributing stations, to which all purchases for specified areas are sent, and from these delivered. This plan requires a distribution from the store, and then transfer of purchases from the store to the zone stations, each station having delivery facilities practically the same as the store, but not so frequently served routes.

One will understand that this system requires store and station and transfer service, and that expeditious delivery is as necessary at any one locality as another. Competition impels this service. It is as necessary as quality of stock to attract patronage. The desire is not only to maintain its efficiency, but to improve it

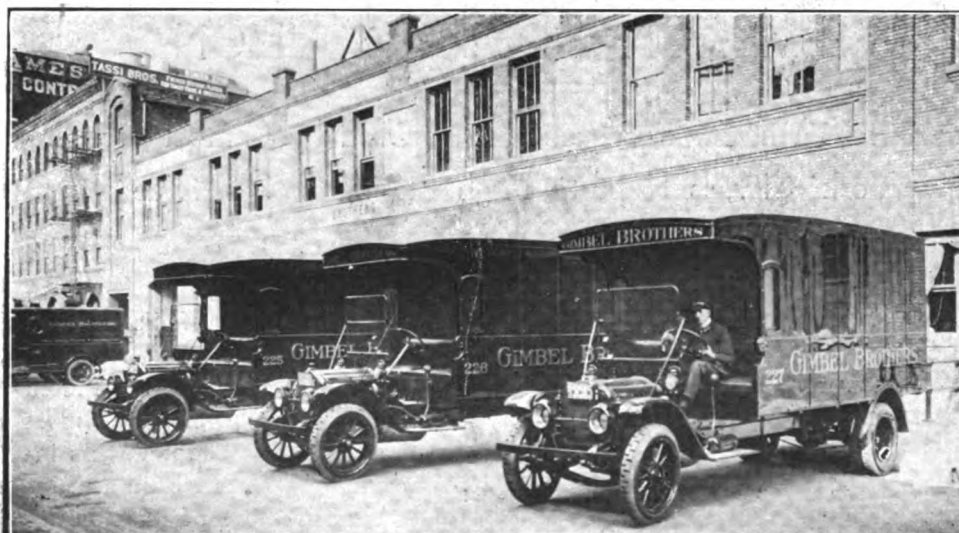


Loading One of Gimbel Brothers' Three-Ton White Trucks at the Warehouse—These Machines Are Specially Equipped for Transfer Service.

wherever such improvement is practically possible.

An outline of this company's plan of delivery will be necessary to comprehend the general statement which will follow, and which has to do with the character of maintenance. The store is at Broadway, Thirty-Second and Thirty-Third streets. The main garage is between Tenth and Eleventh avenues in Twenty-Fourth street. The outside stock is generally at the terminal warehouses, in Twelfth avenue, at Twenty-Seventh and Twenty-Eighth streets. Unless taken direct from the warehouses all deliveries originate at the store.

The direct store delivery may be regarded as the



A Group of Three New White Two-Ton Trucks Which Are Fitted with Specially Designed Fully Enclosed Bodies Ready for Regular Use.

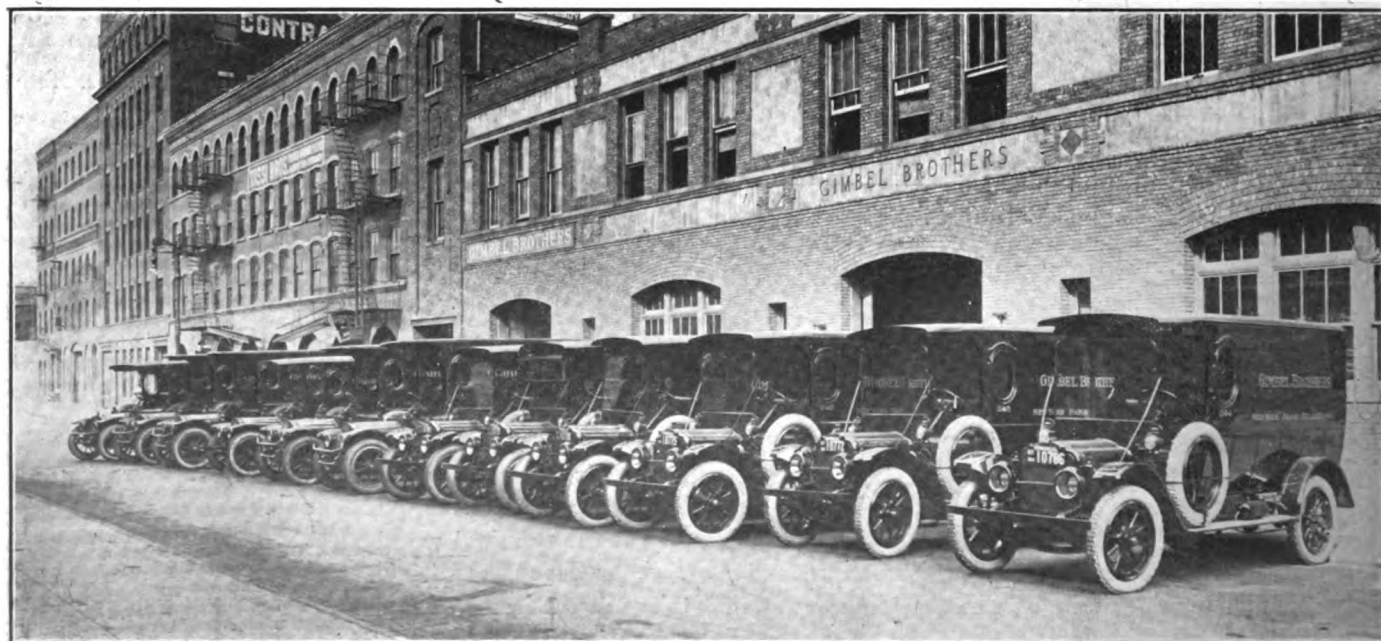
central zone, and outside of this were originally seven constant distributing stations, at the Bronx and White Plains north of the city, at Brooklyn, Flushing and Far Rockaway on Long Island, at Newark and Hackensack, N. J., and at Long Branch, N. J., during the summer season. With seven stations at all times, transfer service was necessary, entailing one or more vehicles for this work for each point of distribution. Goods for Long Branch are not sent by highway vehicle.

Careful study resulted in the discontinuance of the stations at Bronx and White Plains, Brooklyn, Flushing and Far Rockaway, and the location of two others, at Tuckahoe, which replaces the first two named, and at Queens, which affords the service for the last three mentioned, so that by judicious consolidation and careful routing a better service in increased areas is afforded, and greater economy obtained. No changes were necessary in the New Jersey stations. The ma-

terial reduction in number of transfer vehicles may be noted because of the decreased number of stations, four transfers being made instead of seven. The volume of stock transferred, however, has increased, especially with reference to the Tuckahoe and Queens stations.

As it now exists the delivery system of Gimbel Brothers may be regarded as definitely established. The company has for each zone a combination garage and distributing station. These buildings are isolated, have been constructed to afford every facility and convenience and are thoroughly fireproof. Nothing that would serve a useful purpose, protect property or insure safety is lacking. The garage divisions are sufficient to provide for expansion of the service, and the distributing stations are ample and have equipment for handling much larger volumes of goods than are now handled. Everything that long experience and good judgment would suggest has been provided.

The delivery vehicles owned by the company number 138, of which 53 are White gasoline wagons and trucks, and 85 are Studebaker electric wagons and trucks. The machines are used with reference to their service economy, each type being placed where it will best serve. That is, the electrics are used where the routes are of such character that they can be operated advantageously, and the gasoline machines are used on the longer routes, where large areas are traversed. Of the electric machines five are kept at Newark and two at Tuckahoe, the remainder being attached to the Twenty-Fourth street garage. Of the gasoline ma-



Twelve of the 1500-Pound White Wagons with the Type of Bodies Adopted for Gimbel Brothers' Delivery in Suburban Sections.

chines six are kept at Tuckahoe, five each at Newark and Queens, and four at Hackensack, the others are operated from the main garage.

Now as to the service: The delivery direct from the store is made in Greater New York, Jersey City and the nearer sections of Brooklyn by electric wagons, and by gasoline wagons and trucks to points as far as Bayonne, N. J., to Seagate, Sheepshead Bay, Williamsburg and Long Island City, on Long Island, and north as far as the Mount Vernon and Yonkers lines, which is by 78 electric machines and 33 gasoline vehicles.

At the Tuckahoe station are six gasoline wagons that deliver in Yonkers, Mount Vernon, Pelham, New Rochelle, and all points east along the Long Island sound shore as far as South Norwalk, Conn., which is 45 miles from the store, and to White Plains and up the Hudson river as far as Tarrytown, which is 25 miles from the store. With special orders this station will deliver north to Peekskill, which is about 43 miles from Greeley square. The Tuckahoe station is approximately 19 miles distant from the store, but the distribution from it extends south to meet the routes on which direct delivery is made. In the original service the store routes and those of the Bronx and the White Plains stations served three zones. Tuckahoe is about four miles south of White Plains. This was selected as the central point for the zone that is much like a fan, extending north of the Mount Vernon and Yonkers lines between the Hudson river and Long

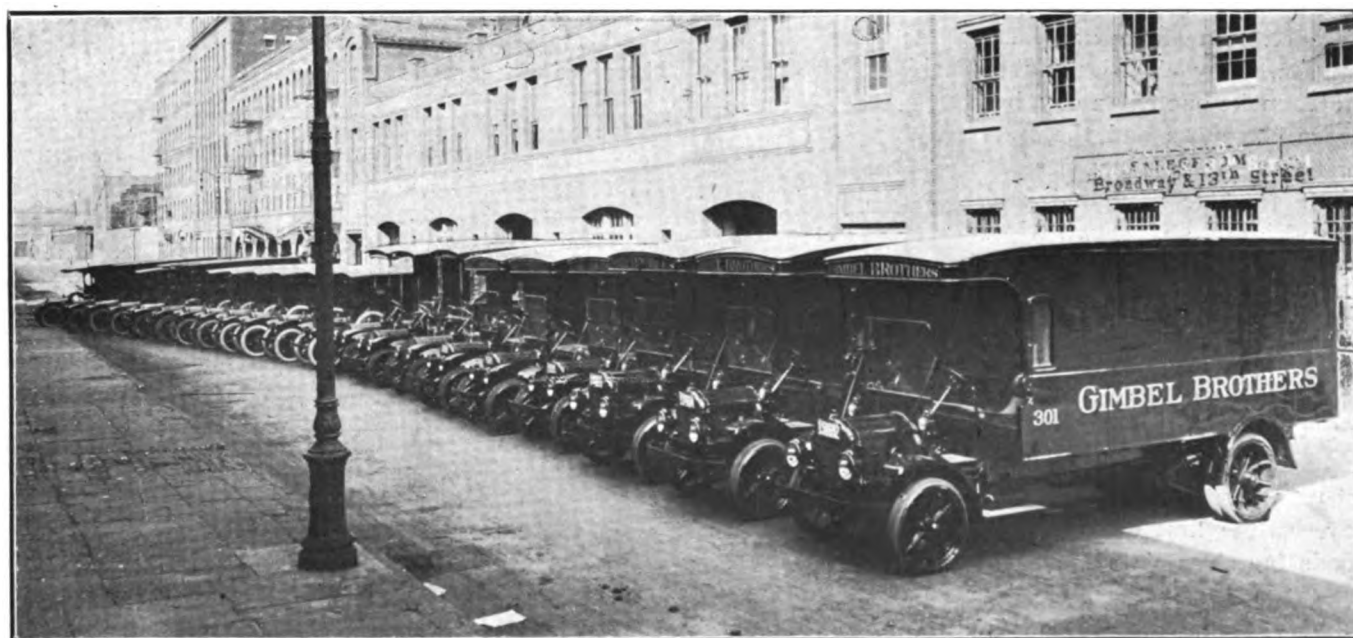
Island sound, covering about 30 miles along the river and the sound.

While the west side of the Hudson river for a short distance inland is served from the New York store, there is a very populous section that includes Newark, Passaic, Paterson and towns and cities of less importance, which the Newark and the Hackensack stations serve. The Newark station has five gasoline and five electric wagons attached, of which the five gasoline and one electric are constantly in use, the electric for Newark delivery, while the gasoline machines distribute as far west as Morristown, or approximately 20 miles. Roughly approximating a radius of 20 miles is covered regularly. Newark is about 12 miles from the store. Hackensack is about 13 miles north of Newark and is about 11 miles from Greeley square. From this station the surrounding country is served for a radius of 10 miles, five gasoline wagons being used.

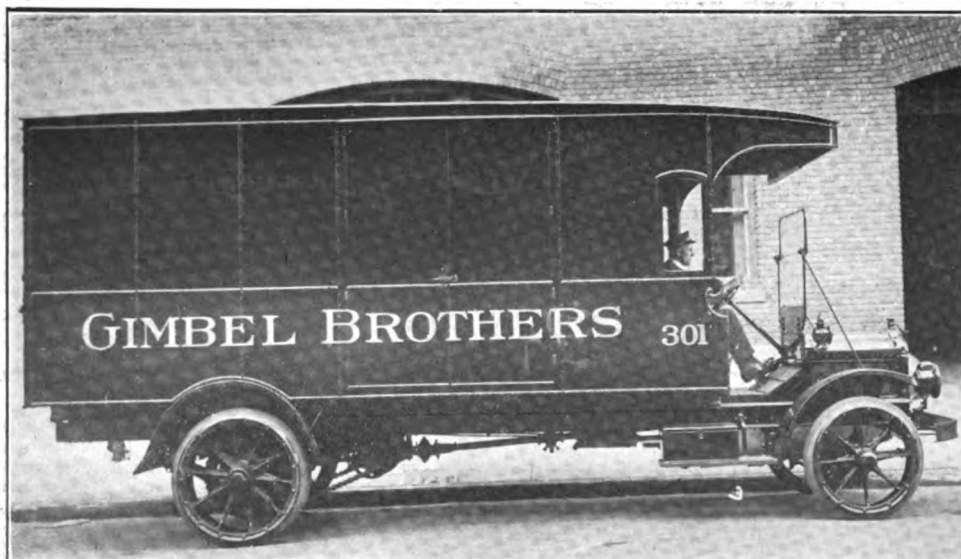
The Queens station is about 15 miles from the



Three Three-Ton White Chassis with the Theft Proof 16-Foot Bodies Designed for Transfer Haulage Between the Store and the Suburban Stations.



Twenty-Nine of the 53 White Machines Used in the Delivery Department of Gimbel Brothers' Department Store, in Front of the Garage in West 24th Street, New York City.



Three-Ton White Chassis Equipped with a Gimbel Designed Body, the Wood Panels Covered with Steel, with Right Side and Rear Doors.

store and here five gasoline machines are in service. The western end of Long Island, within a radius of 30 miles, is given delivery, aside from that section that is not served direct from the store.

The stations are of considerable proportions, that at Queens being 50 by 150 feet, that at Hackensack 50 by 125 feet, that at Newark 60 by 125 feet, and that at Tuckahoe 50 by 150 feet. Each of these has an unloading platform with bins for each route and for special purposes and every facility for quickly handling the goods. The packages for each of these stations are sorted in the shipping room of the store and after the completion of this work, usually early in the evening, the goods are loaded into the transfer truck and sent out. If more than one truck is necessary for each station, additional machines are provided, but usually one is sufficient. No transfer work is done Sundays.

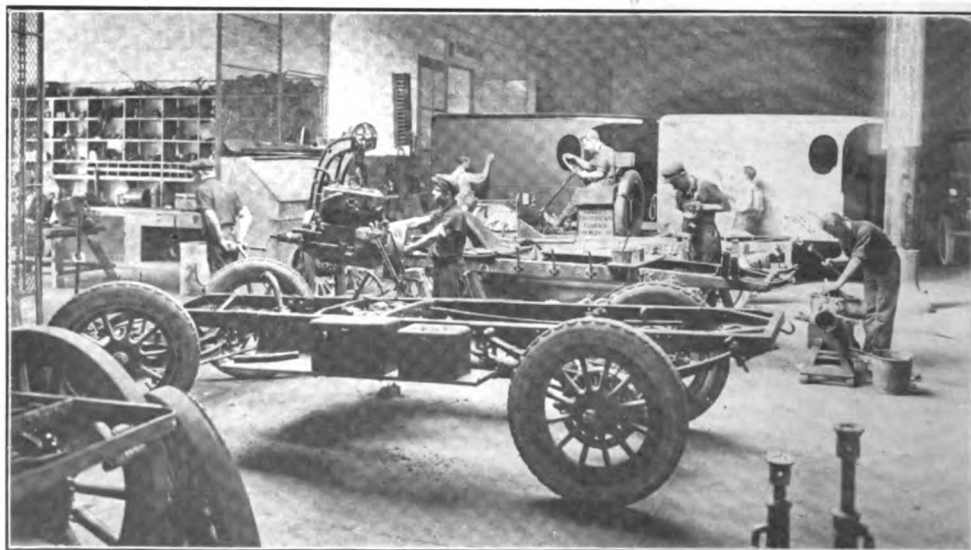
The route deliveries from the store will be from one to five a day, according to the demands and the distance. On Manhattan Island practically all routes are served by electrics. The machines for the long routes make one trip a day, between the store and the Battery two trips, from the store north to One Hundred and Sixty-Eighth street two trips, from the store to Harlem two or three trips. The deliveries from the zone stations are made usually once each day. The general policy is to send out whatever is bought very early in the day, with the latest purchases of the previous day, by the first delivery; all goods bought up to 2 o'clock are taken out by the 3 o'clock delivery, and whatever is bought later than 2 o'clock is usually delivered the following

day. The wagons are loaded so as to have the service best convenience the customers, the single-trip machines taking the largest loads. Those covering a route more than once must be governed by a schedule of departures. Special deliveries are made without reference to schedules.

An average of about 28,000 packages is delivered daily within a radius of 15 miles, or about 8,400,000 packages annually, aside from the deliveries made by express and parcel post beyond that radius. At the station at Long Branch three gasoline machines are

used during the summer, but delivery there is made by express at other seasons of the year.

The transportation equipment of the company consists of 53 White gasoline machines, three three-ton trucks, three two-ton, seven 1½-ton and 40 1500-pound wagons, 77 Studebaker electrics, 38 of 1000 pounds, 27 of 1500 pounds, six of 2500 pounds and six of 7000 pounds capacity, and six 1000 and two 2000-pound Lansden electric wagons. Of the White machines the three three-ton trucks have just been delivered, these being fitted with 16-foot panel bodies for night transfer. These bodies were built to specifications and designs by Garage Manager Charles A. Duerr and Shop Superintendent H. T. Beardslee. The bodies are wood, the sides and rear end covered with steel plate, and have double doors on the right side and the rear, so as to be loaded advantageously without obstructing a narrow street. The doors and the tail gates may be locked when leaving the store and the loads fully protected against theft until arrival at the distributing stations. Three two-ton White trucks



Interior of Gimbel Brothers' Garage, Showing the Method of Rebuilding Trucks, the Three Chassis Being in Process of Disassembling, Assembling and Ready for Test.



White 1500-Pound Chassis, After Rebuilding, Ready to Leave Garage for the Road Trial.

have been fitted with similar bodies, somewhat smaller, for furniture delivery. The machines of any given capacity have the same body equipment.

The company has just taken delivery of 12 new White trucks and wagons, and 29 of the gasoline vehicles are shown in front of the garage in West Twenty-Fourth street. The proportions of the equipment will be the better realized when the statement is made that this picture shows approximately 21 per cent of it.

The main garage was originally built for electric vehicles exclusively. It is admirably constructed and arranged, and although occupied only about three years, despite the four zone stations, it is greatly congested and expansion will be absolutely necessary. Additional stories cannot be added because the foundation is not sufficient in the opinion of the building inspectors. Yet thus far endeavor to secure a satisfactory building conveniently located has not been successful. The intention was to house from 80 to 90 machines in this garage, which has 73 charging stations and high-grade equipment throughout, but the increased demands for maintenance have necessitated the use of considerable space for other purposes.

The operation of the garage has been splendidly systematized by Manager Duerr, and very high efficiency is obtained at what may be said to be minimum expense through the method of maintenance that practically eliminates depreciation. One must understand that appearance is highly valued. The equipment must be kept to a high standard, so as to have the units serviceable at all times, and economy must always be considered.

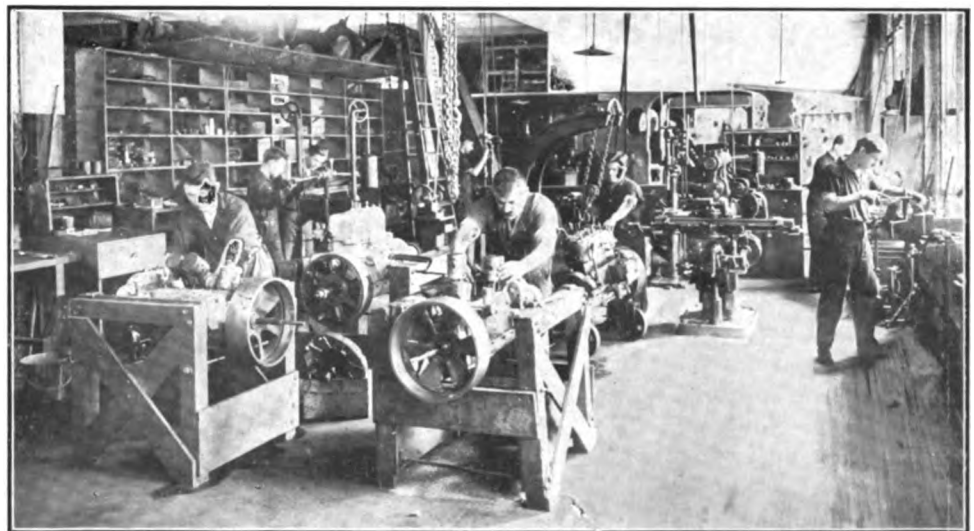
With practically all motor

vehicle services the policy is to charge depreciation in the operating cost, and to assume that at the expiration of a period any machine will no longer be serviceable—that it must be replaced from the sinking fund created from the depreciation charges, or by funds taken from capital. But Manager Duerr has established that this theory is all wrong—that a vehicle that is originally well constructed, with a standard body design, can be maintained at its highest efficiency practically and literally equal to all

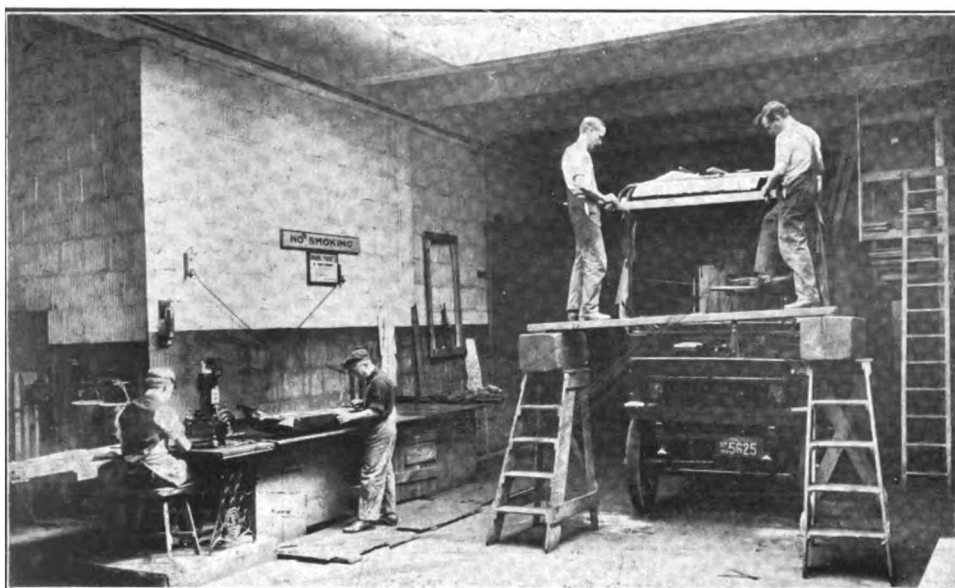
service requirements at an expense that is materially less than is represented by the depreciation charged. In other words, a machine will last an indefinite period, and with systematic upkeep the life is whatever the owner wishes to make it.

This may appear a radical opinion, but it has been proven by experience, and the company has never disposed of a machine. What is bought is meant for service, and service is obtained, but there is no intention of loss through lack of care. To illustrate: The garage is complete. Any work can be done there, for the stock, the material, the machine and hand tools and the workers are instantly available. Trucks and wagons can be built there as well as maintained, if necessary.

Once each year the machines are rebuilt. Instead of what is known as an "overhaul", such as is ordinarily given, the trucks and wagons are disassembled and each part, large or small, cleaned, examined and inspected. The chassis frame is stripped and riveted if need be. Nothing is taken for granted. The vehicle must be as good as new when rebuilding is completed. This process takes about a week. The re-



Where the Gasoline Motors Are Rebuilt, the Engines Seen Including One Just Removed from a Chassis and Still on the Crane, One Ready for Installation, One Being Disassembled and One Partly Assembled.



Rebuilding Includes Renewals of Every Part, Even to Roof Covering and Upholstery, Which the Garage Force Is Prepared to Do.

uilt truck is carefully tested and when it is again sed it is believed to be in readiness for a year's service. While the chassis is in the shop the body is refinished. Several weeks are necessary to do this work, and as the bodies of any one type are interchangeable, one of the several spare bodies is installed and service of the chassis is continued.

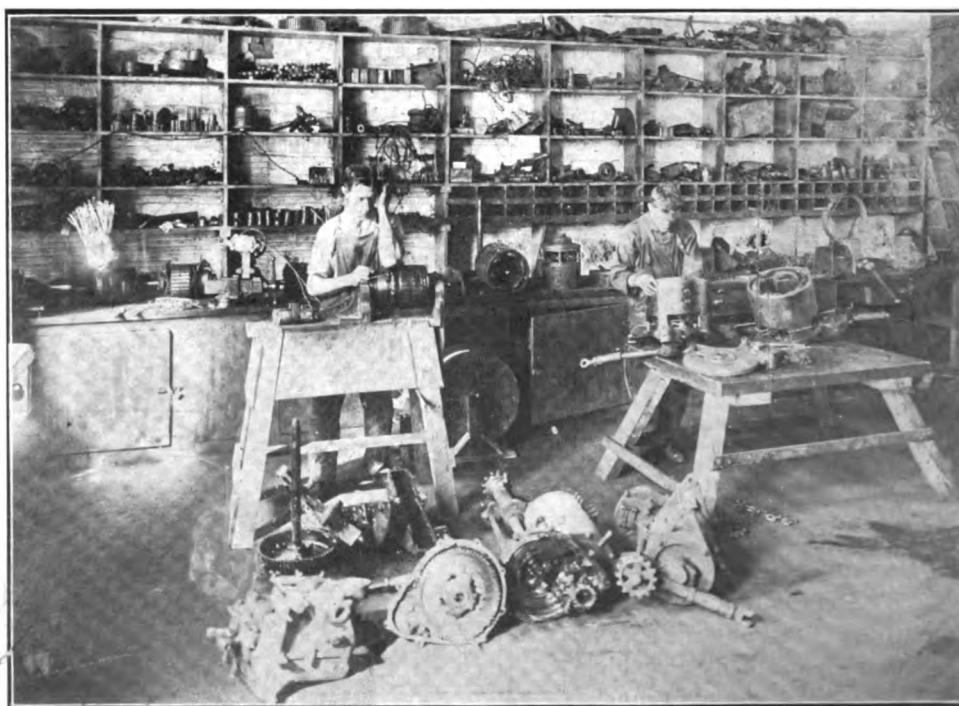
The shop is on the second floor of the garage building. The machine tool room is thoroughly equipped for any work. The stock of parts for each size machine is sufficient to meet any demand and an emergency work can be done quickly and well, but this is not the subject of this article. In the shop from three to four motors are usually in the hands of the machinists. Chain hoists, trolley hoists and cranes make handling easy, and the machine tools are especially adapted for the work of the shop. The wood working shop does all the repairing of the bodies and the metal equipment. The upholstery shop repairs or replaces all cushions, seats, covers, etc., and it even has a sewing machine driven by an electric motor for stitching leather and heavy fabric. The painting department has a varnish room, where the bodies are finished after painting.

The machines are not worn to any material extent. They are completely restored before any deterioration is manifest. In the line of 29 White wagons and trucks shown in the accompanying illustration, a 1500-pound vehicle three and a half years old that had

just been rebuilt. It could not be distinguished from those that were just placed in service, either in appearance or operation, and aside from its number one would not believe from examination that it had been used to an extent when most owners would doubt its value. Yet, from the Gimbel viewpoint, it is the equal to the new—at least it is just as serviceable and as good as any of the same size for Gimbel purposes.

The machines, when delivery is taken, are first given a careful mechanical test over a measured course. One route, for instance, is north on Tenth avenue to Broadway, up Broadway to the One Hundred and Twenty-Ninth street ferry, to Edgewater, N. J., up Fort Lee hill, south on the boulevard to the Forty-Second street ferry, and south on Tenth avenue to the garage. The inspection report must be signed for the company building the machines, and for the Gimbel Brothers by the companies' inspectors, by the shop superintendent and the garage manager, this covering every assembly and important detail of construction and operation, even to the painting and the tool equipment, the ferry charges, and also shows the consumption of gasoline or current.

This record must show the vehicle meets all the requirements, not only as to construction, to appearances and to equipment, but its power must have been



The Electric Vehicle Department of the Repair Shop, Showing Armature Test, with Several Motors Ready for Examination and Restoration.

proven on the Fort Lee hill and it must show a consumption of fuel that is within the volume regarded as a standard before the machine is accepted. When a wagon or truck is rebuilt it is just as carefully tested.

The machines are used continuously and they are not spared in the sense of nursing them, but they are never overloaded and they are adjusted and repaired whenever there is indication of either work being needed. Exceedingly careful record is kept and from this extremely valuable information is instantly available for the garage manager. He has placed before him each day a report that shows how many vehicles are in actual service at each garage, how many are in reserve and how many are in the shop. At a glance he can account for the entire equipment. Detail of all machines not on the road can be obtained at any minute. Every fact that has to do with work performed, with operating or maintenance cost, is recorded. In fact, record is the basis of the efficiency and economy of the service.

One of the White 1500-pound wagons is in readiness with such supplies and tools as may be needed for any work on the road. In the event of a machine being damaged by accident or failure, it is not hauled in with a plank supporting an axle, for instance. Instead, so far as possible a temporary repair is made and it is driven or towed in. Should a wheel or an axle break a spare axle or a spare wheel, for spares are always ready for such emergencies, is placed in the little White wagon, and it is sent out with men who can do the work quickly and well. When back at the garage a permanent repair or restoration is made. The drivers do no work on the machines.

In the repair shop spare wheels with tires of each size for each type of wagon are in lockers ready for use when needed. There are, to illustrate, three spare motors, two spare rear and two spare front axles and two gearsets for the 1500-pound wagons, spare rear and front axles for the 3000-pound wagons, radiators, shafts, springs, fenders, and practically every necessary part that would be required for any restoration. The stock rooms contain parts sufficient to assemble several machines. There is no need of delay for any reason. There are facilities for doing all work economically. The garage is piped for air and gas, and gas torches can be used for any purposes, from straightening a chassis frame to burning paint. There are even rivet heaters, so that the best of work can be done at any time. The shop has a blacksmithing department with men competent to do hand forging and fitting, and stock of lumber, of sheet and bar steel, and other metals, of sheet aluminum, of canvas for roofs and cushions, of leather for upholstery, of paints of all kinds, varnish, and, in fact, every supply that could be found in the most complete factory, is kept on hand.

In the electric department the work shop is equally complete. Every character of work is done, even to making the coils used for rewinding armatures, and no matter what the need it can be undertaken without the least delay. The battery room is unusually large,

and in this usually four spare batteries are ready for use. Here the batteries are built from material purchased in knock-down form, being assembled as needed. When assembled they are formed and are made ready for service.

The tool room is very complete and all tools are supplied by a check system that insures against loss. System obtains everywhere, because it is economical from every point of view. The gasoline storage plant is protected thoroughly against fire. The lubricants are kept in a fireproof room and the different grades are designated by number, so that there can be no possibility of error, as different oils and greases are used for different purposes and at different seasons of the year.

The supervision of the main garage and those attached to the zone stations is by **Garage Manager Duerr**, he devoting his attention wherever necessary. He has a record of the work of each machine, and the time of each is accounted for from the time it leaves a garage until it returns. At each of the zone stations is a superintendent, who is on duty days, and a mechanic and a washer who work nights. Such work as is necessary is done at the zone garages, but anything of importance is done at Twenty-Fourth street. High-class mechanics are employed. The drivers are carefully trained and are educated to the standard required by Manager Duerr. Aside from the drivers the garage department employs upwards of 60 men.

The service has been brought to a condition of efficiency that can have but one result, and that is, as has been stated, practically the elimination of depreciation and a character of service that is as practical as it is surprising.

BUILDING WILSON TRUCKS.

Six Wilson trucks have just been completed by the J. C. Wilson Company, Detroit, Mich. These trucks were the design of G. E. Porter, who is in charge of the production and engineering departments. The Wilson truck is equipped with a Continental motor with three-point suspension, 130-inch wheelbase and an overall length of 198 inches. Detroit springs and Sheldon axles are used. The truck has 1½ tons capacity.

The J. C. Wilson Company is one of the oldest manufacturers of wagons in Detroit, and with its present equipment the company is prepared to turn out about one truck a day.

The American Malleables Company, Lancaster, Penn., has acquired the plant formerly occupied by the Reliance Motor Truck Company in Owosso, Mich., and is now manufacturing all kinds of malleable iron castings, specializing in automobile work. According to present plans the company will operate a plant in Flint, Mich., within the next year.

ELECTRIC VEHICLE MEN IN CONVENTION.

THE fifth annual convention of the Electric Vehicle Association of America was held at the Hotel Bellevue-Stratford, Philadelphia, Penn., beginning Monday, Oct. 19, and continuing three days. The attendance was the largest in the history of the organization, upwards of 500 delegates being present and registered. As the total membership is approximately 900, scattered throughout the country, keen interest in the organization and its activities impelled so large a proportion to attend.

Since the convention at Chicago a year ago, when sections were established in New York, New England and Chicago, the association has increased about 100 per cent. in membership, and it now has sections in Philadelphia, Washington, Pittsburg, Cincinnati, Cleveland, Toronto, Detroit, St. Louis, Denver, San Francisco and Los Angeles. Measured by the number of localities in which active work is now progressing, the association is much larger than is indicated by the statement of membership, and its influence is correspondingly increased and its scope broadened.

The very large development of the association is due to the progressiveness and enthusiasm of President Frank W. Smith, who had the co-operation of Joseph F. Becker, chairman of the committee on membership and formation of sections, and to the fact that there is keen realization by numerous interests of the possibilities of the use of the electric vehicle for innumerable purposes. The endeavors of the entire organization have been directed toward increasing the strength and influence of the association, and the results have been extremely satisfying.

The arrangements for the convention were made by a committee consisting of Joseph B. McCall, chairman; George B. Muth, secretary; W. C. L. Elgin, J. Crawford Bartlett, William H. Metcalf, Percy H. Bartlett, Fred B. Neely, E. R. Whitney, Carroll A. Haines, R. L. Lloyd, William A. Manwaring and R. L. Heberling of Philadelphia; W. A. Donkin of Pittsburg, Harvey Robinson of New York City, W. W. Freeman of Cincinnati, Day Baker of Boston, Arthur Williams of New York, Stephen G. Thompson of Jersey City, A. W. Young of Camden, N. J., Richard R. Young of Newark, N. J., Stanley Walton of San Francisco, E. S. Marlow of Washington, D. C., E. S. Mansfield of Boston and W. J. McDowell of Chicago.

The programme for the convention was as follows:

Monday, Oct. 19, Morning Session.
Address of welcome, Mayor Blankenburg of Philadelphia.
President's address, Frank W. Smith of New York.
Executive Secretary's report, A. Jackson Marshall of New York.
Treasurer's report, Day Baker of Boston.
Report of the Committee on Constitution and By-Laws, Frank W. Frueauff, chairman.
"What the Sections Are Doing", reports from the secretaries of New England, Chicago, Philadelphia, Washington, Cincinnati, San Francisco, Los Angeles, Pittsburg, New York, Detroit, Cleveland, Toronto, Denver and St. Louis sections.
Report of the Electric Motor Car Club of Boston, by Day Baker, president.
Election of nominating committee.
Afternoon Session.
Report of the Committee on Parcel Post Delivery by James H.

McGraw, chairman.
Report of the Committee on Membership and Formation of Sections by Joseph F. Becker, chairman.
Report of the Committee on Garage and Rates, by John F. Gilchrist, chairman.
Paper, "Progress of the Electric Vehicle", by James H. McGraw of New York City.
Paper, "European Development of the Electric Vehicle Industry", by P. D. Wagoner, president of the General Vehicle Company, New York City.
Paper, "Electric Fire Apparatus", George S. Walker, chief mechanic of the Philadelphia fire department.
At the conclusion of the session a demonstration of Philadelphia's electric fire apparatus was given at Tenth street, near Market street, and at Sixth street, near Locust street, for the benefit of the delegates.

Evening Session.
Report of the Insurance Committee, by Day Baker, chairman.
Paper, "Charging Apparatus for the Private Garage", by J. F. Lincoln, president of the Lincoln Electric Company, Cleveland, O.
Paper, "Special Applications of Electric Trucks", F. Nelson Carle, Advertising Manager of the General Vehicle Company, New York City.
Report of the Moving Picture Film Committee, by W. C. Andrews of the Edison Storage Battery Company, chairman.
"Selling Electric Vehicles", a burlesque moving picture, posed for by members of the association.

Tuesday, Oct. 20, Morning Session.
Report of the Good Roads Committee, Col. E. W. M. Bailey, Boston, Mass., chairman.
Report of the Committee on Legislation, P. D. Wagoner, chairman.
Report of the Committee on Educational Courses, M. W. Alexander, chairman.
Paper, "A Wider Dissemination of Electric Vehicle Information", T. I. Jones, manager commercial department, Edison Illuminating Company, Brooklyn, N. Y.
Paper, "A Practical Project to Secure Authentic Costs of Operating Commercial Electric Vehicles", William P. Kennedy, consulting engineer, New York, N. Y.
Paper, "Educating the Public to the Field and Use of Electric Vehicles", F. C. Henderschott, chairman of the committee on the education of salesmen of the National Electric Light Association.

Afternoon Session.
Paper, "Power Wagon Operation in Central Station Service", W. A. Manwaring, superintendent of transportation, Philadelphia Electric Company.
Report of the Committee on Central Station Co-Operation, by W. W. Freeman, Cincinnati, O., chairman.
Report of the Committee on Operating Records, William P. Kennedy, chairman.
Paper, "The Cost of Electric Vehicles", George H. Kelly, secretary and sales manager, Baker Motor Vehicle Company.
Paper, "Constant Potential System of Charging from Motor Generators", H. P. Dodge, general manager, Ohio Electric Car Company, Toledo, O.

Wednesday, Oct. 21, Morning Session.
Report of the Standardization Committee, by E. R. Whitner, chairman.
Report of the Traffic Committee, by David C. Fenner, chairman.
Report of the Papers Committee, by Stephen G. Thompson, chairman.
Paper, "Electric Vehicle Performance", Robert B. Grove, statistician, engineering department, United Electric Light & Power Company, New York, N. Y.
Paper, "Effects of the Utilization of the Kinetic Energy of an Electric Vehicle", T. H. Schoepf, Westinghouse Electric & Manufacturing Company, Pittsburg, Penn.
Election of officers.

Afternoon Session.
Symposium, "The Electric Industrial Truck", papers contributed by the Automatic Transportation Company, Buffalo, N. Y.; Elwell-Parker Electric Company, Cleveland, O.; General Vehicle Company, New York, N. Y., and C. W. Hunt, Inc., New York, N. Y.
Paper, "Calculations of Electric Motor Characteristics and Prediction of Vehicle Performance", A. A. Nims, Crocker-Wheeler Company, Ampere, N. J.
Paper, "The Development of the Electric Vehicle Motor", H. S. Baldwin, the General Electric Company, Lynn, Mass.

The convention elected the following officers for the year to come: President, John F. Gilchrist, Chicago, Ill.; vice president, Walter H. Johnson, Philadelphia, Penn.; treasurer, H. H. Edwards, New York City; directors, Frank W. Smith, New York City, Charles Blizard, Philadelphia, E. P. Chalfont, Chicago, and J. H. McGraw, New York City. The chairmen of the different sections become vice presidents of the organization automatically upon their election.

EDUCATING PUBLIC TO ELECTRIC VEHICLES.

New York Exposition Exhibitors Co-Operated to Demonstrate Qualities of Pleasure and Service Machines and Practical Methods of Operation and Maintenance.

SPECTACULAR because of the innumerable forms of lighting, and intensely practical because of the seemingly unlimited possibilities for utilizing

those desirous of information could examine machines shown at the different stands, could witness or take part in demonstrations on the track on the third floor of the building, or they could be driven through the streets of the city and have the machines used in practical service conditions.

The exhibits included freight wagons and trucks shown by the General Vehicle Company, the Ward Motor Vehicle Company, and the Commercial Truck Company of America, and pleasure cars were displayed by the Baker Motor Vehicle Company, the Anderson Electric Car Company, Rauch & Lang and S. R. Bailey & Co. The number of machines was sufficient to constitute a very interesting exhibition, and the opportunities for observation were such that



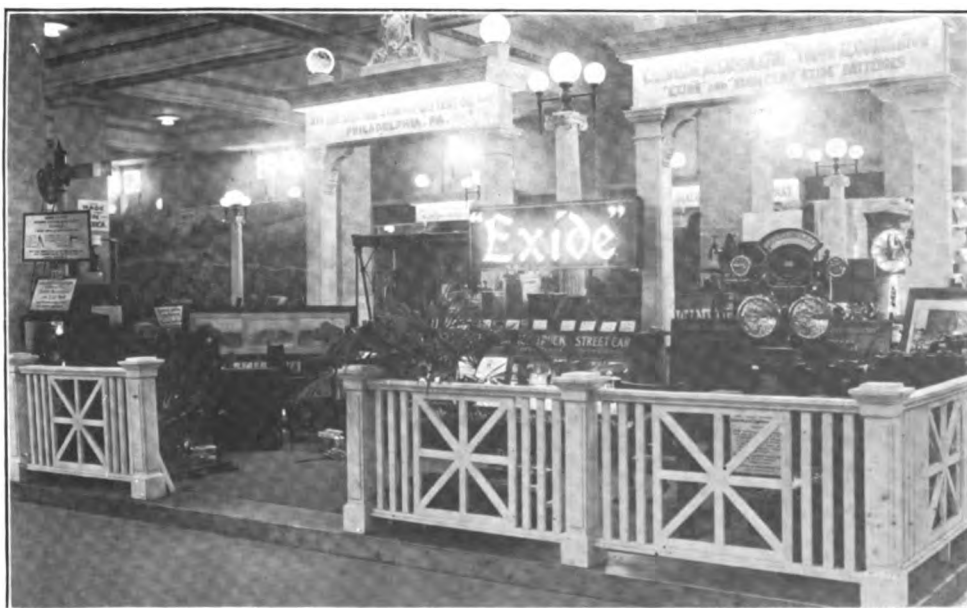
Stand of the General Vehicle Company, at Which Was Displayed a 2000-Pound Chassis with a Special Baker's Body, and a 1000-Pound Worm Driven Chassis with Panel Body.

power and heat, the annual Electrical Exposition and Motor Show of 1914, which was opened at the Grand Central Palace, New York City, Oct. 7, and was continued for 10 days, was one of the most interesting demonstrations of the use of electric energy for light,

power and heat the world has ever known. Each year the exhibition has been made more comprehensive and attractive, for the exhibits have qualities that interest all peoples, no matter what the sex or age, and adaptations are shown which are available for the sciences, arts, professions, trades, industries and educational, social and domestic purposes. In these expositions the national, state and municipal governments are directly concerned, and one could state without exaggeration that no other utility could be so generally and broadly demonstrated.

From the viewpoint of those interested in vehicular transportation the exhibition had unusual attraction, for

a considerable part of the visitors were attracted to them. The purpose of the expositions has been to educate the people to the economy and utility of electric equipment and apparatus, and this policy was demonstrated with particular reference to vehicles by the extremely careful preparation made, so that one could follow a machine through the process of construction,



Stand of the Electric Storage Battery Company, Philadelphia, Penn.



Exhibit of the Edison Storage Battery Company, Orange, N. J.

learn the principles of design and operation, and intelligently grasp the methods of maintenance.

This afforded those interested the opportunity of educating themselves in the fundamentals, and of obtaining knowledge that would be desirable with the possession of electric vehicles, yet could not be acquired in any other manner than by study and experience. In other words the purpose was to eliminate theory so far as possible and illustrate the practicalities of the use of electrics, taking up the operation and care and the details of maintaining that were believed to be desirable and necessary for those engaged in inquiry into transportation problems.

One opinion prevailing with those not well informed is that the electric vehicle is extremely limited in mileage capacity, and another is that the cost of operation is considerable unless costly equipment is installed, and for this reason one of the purposes of the exhibitors of machines and the New York Electric Vehicle Association (a section of the Electric Vehicle Association of America), was to present facts to all interested that could be demonstrated beyond a question.

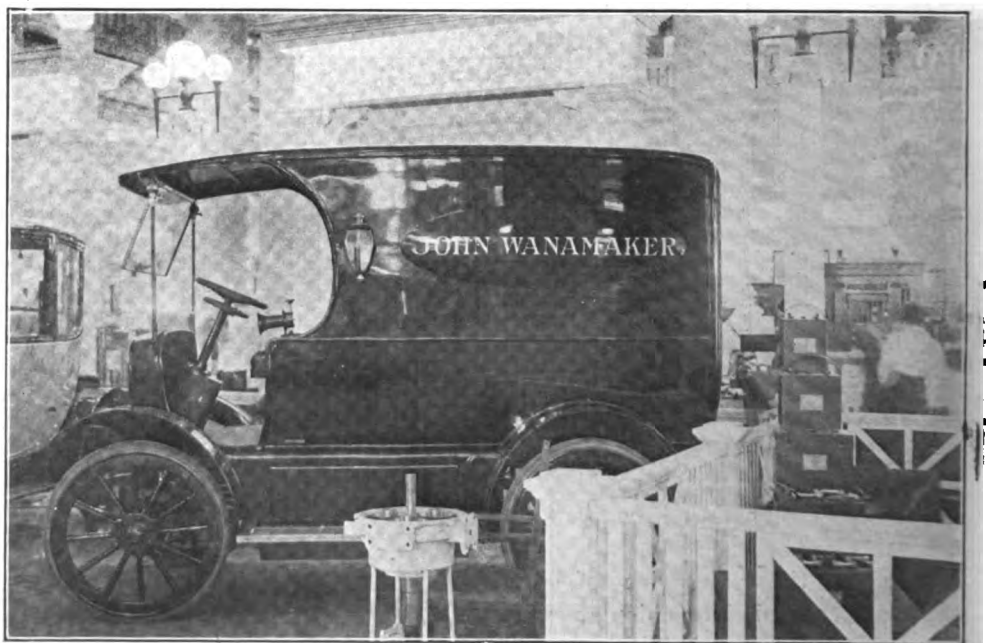
The exhibitors of machines and the association co-operated in this educational work, in which they were joined by a number of large industrial interests, and a systematic endeavor made possible a joint exhibition of vehicles and garaging equipment that was remarkably complete. The association had headquarters, at which all inquirers were received and given general information relative to electric ve-

hicles, and all detail desirable concerning the possibilities for current supply for private garages, the character of equipment that could be installed, approximate cost of service, and facts that were essential to learn with reference to operating efficiency and economy.

The activities of the association were without reference to any make of machine, they being intended to supplement the work of any selling organization, and to be broadly promotive. But in addition to this the practicality of haulage by electric vehicle was demonstrated from the information in the possession of the organiza-

tion. The Electric Vehicle Association of America was also represented by Executive Secretary A. Jackson Marshall, who was prepared to place at the disposal of any interested person the resources of that organization with reference to the use of electric vehicles. The exhibitors demonstrated the machines either at the stands, on the track, in the model garage or in the streets, and because of the co-operative system could give information with reference to any location within a considerable distance from New York and could advise on any subject that might arise.

The track on the third floor of the building was approximately 100 yards in circuit, and this was enclosed by railings with entrances to the area enclosed, in which was the model garage. For the purpose of demonstrating, one section included a single-story wood frame, metal sheathed structure of portable type, this being practically fireproof, and in this was



Main Floor Exhibit of the Commercial Truck Company of America, a 1000-Pound Chassis Driven by Two Motors, with Department Store Delivery Body.

shown a large diversity of hand and machine tools and equipment necessary for the repair and maintenance of electric vehicles. These machine tools were equipped with motors to supply power, and were shown in operation. They were in charge of salesmen and mechanics who described and demonstrated them practically, and as these tools were selected with the view of showing just what would be necessary to equip a shop to perform any work of restoration and repair, a visitor could easily learn precisely of any fact desired.

The man who was considering the desirability of establishing a private garage had opportunity for learning what equipment would be necessary to efficiently maintain his vehicles, could witness operations and gather data with reference to whatever would serve his purposes, and could be supplied with information relative to operating costs and make estimates as to area required, power, qualifications of workers required. The person considering the establishment of a public service station could obtain definite detail with regard to any department when a maximum capacity was stated, and determine what would best meet with economic and service requirements.

The garage was in itself an exceedingly comprehensive display and was more than ordinarily educational. Besides the display of tools and equipment, a large tablet was shown by the General Electric Company. On this was placed a pleasure car chassis equipment, including the motor, controller, battery resistance, switch and combination voltmeter and ammeter and power wiring, with the receptacle and wiring for battery charging. This was to demonstrate



Display of the Philadelphia Storage Battery Company, Philadelphia, Penn.

the control of the machine, and beginning with charging one could follow the functions of the battery (which was represented by a dummy), the resistance, the controller, the motor and the indicating instruments, these illustrating the extreme simplicity of the power system. As the same principles apply to a machine built for freight carrying, this tablet was sufficient for any demonstration desired. The value of this illustration, which would hardly be practical even with a completed chassis, is obvious.

Considering the garage machine shop, this included an extension lathe, with large swing that could be utilized for a very large number of purposes, and two drill presses, these being exhibited by the Prentiss Tool & Supply Company, two shapers that were shown by Gould & Eberhardt, a portable forge that was displayed by J. H. Williams & Co., hand and bench vises supplied by the Charles Parker Company, emery wheels of different sizes by the Carborundum Company, electric air compressors and bench and hand drills by the United States Electric Tool Company, polishing motors by the Westinghouse Electric



The Two Latest Productions of the Ward Motor Vehicle Company: At Left, the 750-Pound Wagon, Fully Equipped, and the Stripped 750-Pound Chassis; at Right, the Five-Ton Platform Truck and 2000-Pound Chassis with Top.



Machine Shop That Was a Feature of the Model Garage, This Showing Fireproof Metal Construction with a Display of Tool Equipment.

& Manufacturing Company, drills, taps, dies and cutters by the Standard Drill Company and the Union Twist Drill Company, charging plugs by Albert and J. M. Anderson Company, different types of electric vulcanizing by tire repairing, by the C. A. Shaler Company, vehicle washers by the I. W. Smith Company, motor vehicle accessories by the Auto Supply Company, while the garage building was the exhibit of the Andrew Greis Company.

In this machine shop was also shown a partly constructed chassis of the Ward Special electric delivery wagon, without wheels, which was sufficiently completed to illustrate the character of the material and the workmanship in the vehicle.

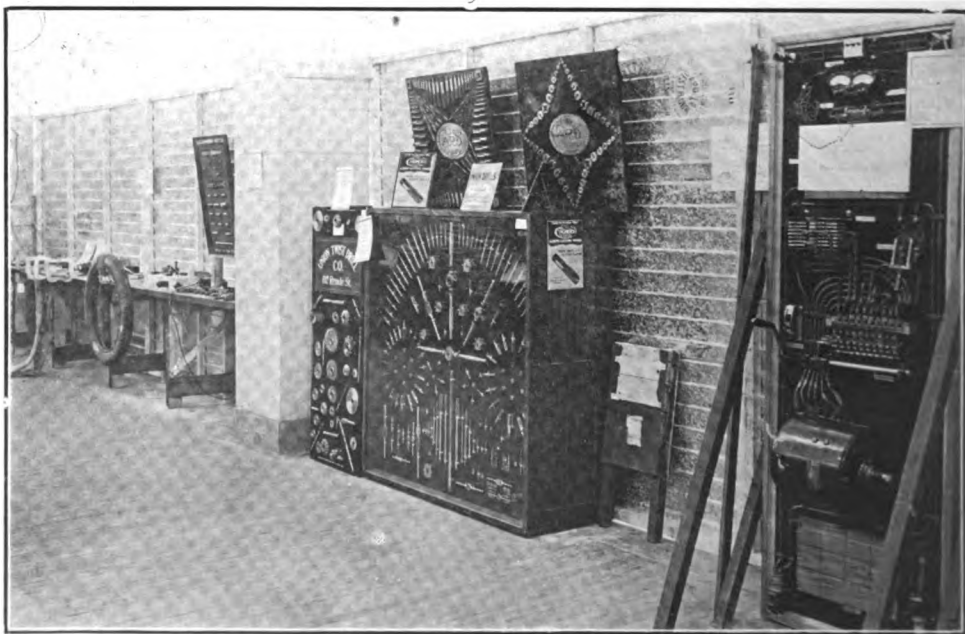
The main floor or storage department of the garage was so large that the few vehicles generally there appeared to be insufficient to demonstrate, but this contained practically every type of equipment that can be utilized in charging. For instance, there was a type 30-R rotary automatic rectifier, built by the Electric Products Company, Cleveland, O.; a Westinghouse mercury arc rectifier, and a General Electric type C 50-ampere, 150-volt mercury arc rectifier, all of which were used for charging vehicles that were engaged in demonstrating on the track, and a Cutler-Hammer charging panel was also in service, this charging batteries in and out of vehicles from direct current. Thus the visitors had the opportunity of observing energizing batteries by both alternating and direct current.

These exhibits were in charge of attendants who devoted their time to descriptions of the peculiar qualities of each machine.

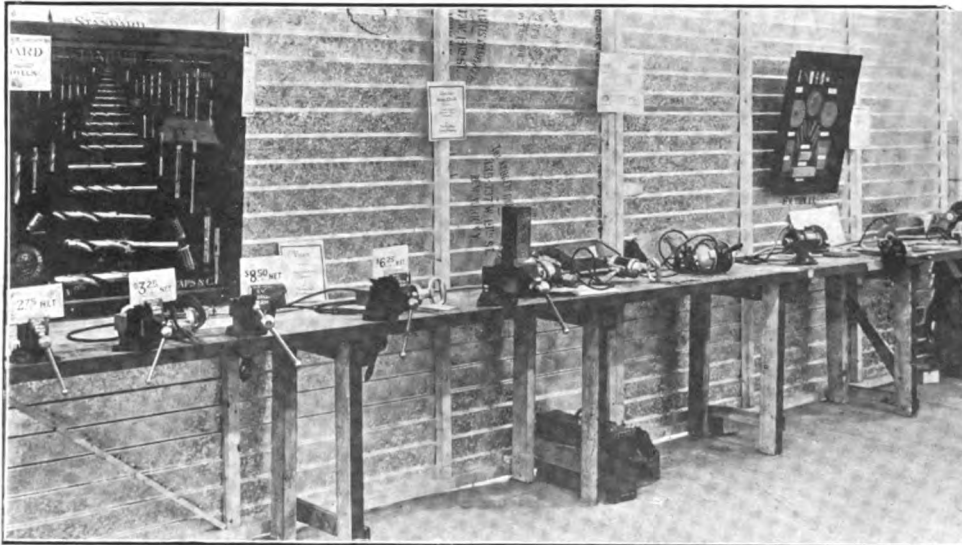
The freight vehicles displayed on the main floor included three different makes, these being the General Vehicle Company, which showed two machines; the Commercial Truck Company of America, which exhibited a new type wagon, and the Ward Motor Vehicle Company, whose exhibit consisted of four types, two of which were new. With reference to these machines, those at the General Vehicle stand were: 1000-pound

chassis driven by a shaft and worm gear wheel, with the battery carried under a hood and a 2000-pound chassis driven by a single motor and side chains from a countershaft. These are standardized types, but both were fitted with admirable examples of fine body work, the lighter machine being ready for delivery to the Eagle Dye Works of Hartford, Conn., and the other to the Loose-Wiles Company at its Boston plant. The vehicles are both intended to have unusual advertising value.

The Commercial Truck Company of America showed at its stand a 1000-pound chassis equipped with a dead rear axle and a motor driving each rear wheel. With this machine the concentric spur gearing affords double reduction, and as the gears are operated in a bath of lubricant, the efficiency is maintained at the highest standard. This type chassis was driven



Tablet Showing Control of an Electric Pleasure Vehicle, a Display of Taps, Dies, Drills and Cutters, and a Tire Repairing Department in Operation.



One Side of the Shop, on Which Was Installed the Different Machine Tools and Forge, All of Which Were Operated and Demonstrated to Visitors.

by worm and gear wheel, but that form of drive has been abandoned, save in the 500-pound capacity chassis, and the two-motor concentric gear substituted. This has been used in the 2000 and 4000-pound types. The 7000, 10,000 and 14,000-pound trucks are driven by four motors. The 1000-pound wagon was built for John Wanamaker, and is to be used at Philadelphia for department store delivery. The panel body was very finely finished.

In the exhibit of the Ward Motor Vehicle Company was a Ward Special chassis of 750 pounds capacity, which is driven by a single motor with shaft drive to a live rear axle with double reduction gears in the differential housing. Two universal joints insure the motor and shaft bearings against side pressure leverage. The motor and controller are Westinghouse constructions, and the usual battery is lead. The battery is carried under the driver's seat and is placed in or removed from the rear end, a removable panel of the battery box affording easy access to it when desired. The axles are Timken built, the frame is pressed steel, the wheels are artillery type, fitted with standard side wire solid band tires 32x2½ inches on both front and rear. The brake is an expanding type, operating within drums on the rear wheels.

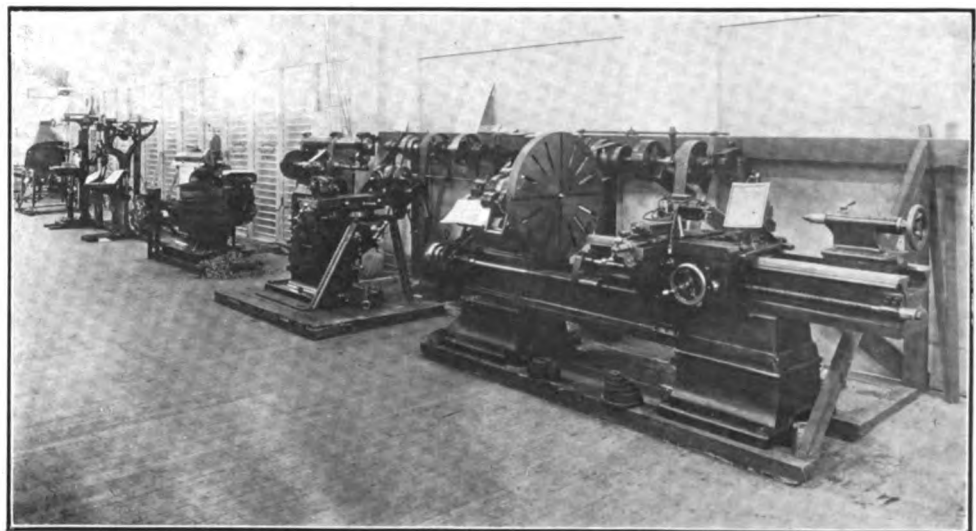
The chassis is equipped with a standard enclosed body, with a substantial wood frame and metal panels, with tail gate and rear curtain, and side curtains for the driver's cab. The roof overhangs the dash. The machine is exceedingly businesslike and is simple and well constructed. The chassis and completed vehicle, a 1000 and a 2000-pound wagon, and a five-ton truck, these all being to the well known Ward

standard design, were shown. The five-ton truck is a new product, however. The company now produces six sizes of vehicle, 750, 1000, 2000, 4000, 7000 and 10,000 pounds capacity.

The Ward Special is designed to serve the needs of those using a single horse and wagon for light delivery work, and is sold for a very low price. It has speed of from 10 to 12 miles an hour and has a battery capacity of from 35 to 45 miles to the charge, according to the operating conditions.

At this stand was displayed a very small mercury arc rectifier, built by the Westinghouse Electric & Manufacturing Company, to meet the demands of those having a single vehicle, who desire to install comparatively inexpensive equipment for charging that will be practically automatic and thoroughly dependable. The rectifier occupies a space about three feet high, two feet wide and one foot deep, and the maximum indications of the ammeter and voltmeter are 15 and 150 respectively. Aside from the indicating instruments and a handle for rocking the rectifier tube, the frame is clear, and the main reactance and the starting resistance are the only coils used. The rectifier is started with a battery as a load and as the battery is charged the amperage is gradually tapered off and will eventually reach a point where the line pressure is approximately balanced by the battery. The rectifier has not as yet been placed in the market.

On the track on the third floor the General Vehicle Company showed a 1000-pound panel delivery wagon built for Frederick Loeser & Co., department store, which was operated constantly during the time the exposition was open to the public for the purpose



Section of the Machine Shop in Which Was Exhibited Different Sizes of Vises, Drills and Grinders as Adapted for Automobile Work.

of determining battery capacity and other operating detail. The company also showed a 4000-pound chassis on the same floor that was intended for demonstration, all of the different groups being painted in colors which corresponded with a large colored chart showing the same assemblies, with description of them and their relation to the operation of the vehicle. This machine attracted a great deal of attention.

The exhibits of storage batteries was exceedingly interesting, these being made by the Electric Storage Battery Company, which showed differing types of Exile, Hycap-Exide, Ironclad-Exide and other products; by the Gould Storage Battery Company, which displayed Gould batteries of different sizes; by the Philadelphia Storage Battery Company, maker of the Philadelphia thin plate batteries, and the Edison Storage Battery Company, which exhibited different forms of the Edison nickel-iron-alkaline batteries.

SOUTH AMERICA NEEDS MONEY.

Money, loans and advances, credits on purchases, and markets at reasonable rates for products which usually go to Europe, are more needed in South America at the present time than a supply of the manufactured products of the United States, according to the report of the Pan-American Union, just issued at Washington, D. C. In making up this report the union obtained cable reports from 34 of the principal cities of 20 Latin-American countries in Central and South America.

BROWN COMPANY BANKRUPT.

The Brown Commercial Car Company, Peru, Ind., was adjudged a bankrupt on an involuntary petition heard by the United States district court for the district of Indiana on Oct. 12. The first meeting of the creditors will be held at the court house at Peru, Oct. 30, at which time a trustee will be appointed, claims examined and approved and other necessary business transacted.

TO OPEN SOUTH AMERICAN MARKETS.

In an endeavor to open new markets in South America for goods formerly shipped to Europe, or supplied by European countries to South America, the American Express Company, in collaboration with the New York Central Railroad Company, has sent two representatives south on a mission of investigation.

J. L. Ware, manager of the Wood Motor Vehicle Company, St. Paul, Minn., plans to erect a motor truck factory in that city.

The production of benzol in the Dortmund mining district of Germany advanced from 29,470 tons in 1909 to 60,401 tons in 1912.

WILL REORGANIZE ADAMS COMPANY.

The Adams Brothers Company, Findlay, O., now conducted by a receiver, is to be reorganized, the plan being for the bondholders to surrender their bonds and accept 80 per cent. of the face value in new notes secured by first mortgage bonds, these notes to be payable 10, 15, 20, 25 and 30 per cent. in one, two, three, four and five years respectively, and the remainder of the claims in common stock; the unsecured creditors to accept 20 per cent. of their claims in cash or 40 per cent. in stock of the company; the present stockholders to surrender 75 per cent. of their holdings, and that \$25,000 worth of the common stock of the company shall be sold at par, the fund thus derived to be used for payment of the claims and providing capital. The consent of practically all the holders of bonds and outstanding notes has been obtained, and a large proportion of the unsecured creditors have acquiesced. The additional capital has been practically subscribed. The statement is made that Murry Irwin of the Lewis Spring & Axle Company, who has subscribed a considerable part of the new stock, will probably become general manager if the plan is approved.

BUYS 15 REPUBLIC TRUCKS.

The Republic Motor Truck Company, Alma, Mich., formerly the Alma Motor Truck Company, has sold to the Indianapolis, Ind., Baking Company, 15 Republic machines, which will be used in general distribution of bakery products from the plant at Indianapolis. The sale was made by the Federal Sales Company, Indianapolis agent for the trucks. The chassis were fitted with a standard type of body, an enclosed type of panel construction, with cab, with doors at the rear. A full load is 1500 loaves of bread. Statement is made that this is the largest initial order ever placed in Indiana. The purchase was made, according to the president of the baking company, after consideration of 22 different bids, a month being devoted to the selection of the machines. During this period of inquiry 15 factories were visited and the products carefully examined.

The automobile show to be held in Boston, Mass., next March will be a combination pleasure and commercial car exhibition, as the separate motor truck shown has been dropped. After careful consideration the members of the Boston Automobile Dealers' Association and the Boston Commercial Vehicle Dealers' Association adopted these resolutions.

R. G. Hargreaves has been appointed efficiency engineer of the Federal Motor Truck Company, Detroit, Mich.

W. M. Hogle has resigned as general sales manager of the Alma Motor Truck Company, Alma, Mich.

ECONOMY OF LOAD HANDLING FACILITIES.

Special Equipment Built for Use with Tractor and Trailers in the Cleaning and Disposal System Installed at the Union Stock Yards at Chicago.

MOTORIZED transportation equipment has a special value when it replaces animal vehicles because of greater speed and larger capacity, but the greatest utility is seldom realized unless facilities are provided that will similarly economize the time of the workers and minimize loading and unloading.

Where a work is of sufficient proportions to justify the use of motor vehicles, system and organization are imperative, and the measure of economy will frequently demand a considerable additional expenditure beyond the purchase price of the machines.

Enterprises of considerable size that have given material attention to the development of vehicle transportation have learned that automobile machines are simply tools, that if they are merely intended to replace animals the investment is often not worth while, but if they are to be a part of an economical system they are extremely valuable.

Economy is intensely practical when a subject is studied with the purpose of providing whatever may be necessary to insure a saving. The possibilities may be such as to impel complete changes. The manure disposal and cleaning system recently installed at the Union Stock Yards, Chicago, Ill., is an admirable illustration of the statement that the motor vehicle in itself would not produce the saving that is made with complete and, in this instance, specially built equipment.

The Mercury Manufacturing Company, Chicago, which has for a number of years built a small type of motor delivery wagon, has extended its activities to the production of special haulage and handling machinery, and is now prepared to undertake designing, building and installing of conveyers, elevators, tractors, trailers and such other apparatus as may be necessary for any specific work.

The cattle are received at the stock yards from cars, kept in pens until sold and removed for slaughter, and must be fed while there. As thousands of heads of stock are in the yard the pens must be cleaned and the manure removed. Until recently this work was done by laborers with four-wheeled dump carts, 40 teams of horses being necessary. The carts were

loaded at the pen and hauled to an elevated platform at the south end of the yard so that they might be dumped into freight cars brought into the yard on a siding. This necessitated the carts being hauled up a steep incline to the platform, which was limited in size because of lack of space.

The horses used in the work were worth \$24,000. The custom was to drive the carts to the pens, they waiting until loaded, and then the carts were hauled to the dump, the average haul being a half mile. The cleaning was done Tuesday, Thursday, Friday and Saturday of each week, so the animals were idle the other three days. But this system appeared to be the most practical and economical.

Desiring to economize the disposal system the



Train of Bulley Tractor and Trailers Making a Right Angle Turn at the Union Stock Yards, Chicago, Ill., Where the Disposal System Has Been Installed.

company controlling the yards conferred with the Mercury Manufacturing Company. The engineers studied the condition and constructed a plan for doing all the work by motor equipment, and this was accepted and the contract made. The plan comprehended the use of tractors and trailers for haulage, dumping apparatus, and sweepers, snow plows and a change of the method of handling the freight cars, and it necessitated the construction of special machines that could be utilized to best advantage in the extremely narrow drives between the cattle pens.

Bulley Tractor and Trains.

Much of the machinery used is the invention of G. W. Bulley, president of the Mercury Manufacturing

Company, and is protected by patents. One of the principal units of the installation is a Bulley tractor, which may be briefly described as being a three-wheeled type, steered by the single forward wheel, with the motor mounted over the rear axle, with the radiator and fuel tank between the engine and the driver's seat. The tractor is controlled by conventional means. It is driven by a jackshaft mounted forward of the rear wheels and by side chains. Because of the construction the tractor can be turned in a short radius, and with a very large part of the weight over the traction wheels it has a drawbar pull of nearly 3000 pounds, or more than half the weight of the tractor.

The tractor is driven by a four-cylinder motor, and because of the location of the engine will not permit hand cranking when the machine is attached to a train (the position of the motor is exactly reversed from usual truck practise) it is started mechanically and by a lever at the driver's seat. The dry plate clutch

yoke carrying the wheel. The lateral movement of the axle in the bearings is prevented by plates. Fixed to the cone ring at the right is a segment of a gear that meshes with an adjustable pinion at the end of the steering column, so that the cone, yoke and wheel can be turned with less effort than is required to steer a pleasure car.

The front wheel is equipped with a solid band tire. The rear wheels have 39 by four-inch dual block tires. The tractor has two sets of brakes. The service set, actuated by foot pedal, are internal expanding within drums 16 inches diameter and three inches on the rear wheels, and the emergency set of the same type operate on the ends of the jackshaft by hand lever.

Bulley Tractor Also Driven by Electricity.

The Bulley tractor is also built to be driven by electric storage battery and motor, and with four wheels, to meet the differing requirements of road conditions, turning radius, fire risk, etc.



Bulley Tractor and Train of Trailers, Illustrating the Perfect Towing Control and Small Working Space Required for This Equipment.

and the Cotta transmission gearset, the latter being assembled as a unit with the jackshaft, are forward of the motor.

Novel Forward Wheel Mounting.

The mounting of the forward wheel is novel. The wheel has a fixed axle, and the ends of the axle are carried on ball bearings in a yoke of steel beams that is so pivoted at the forward end to a big steel ring that it may be given a vertical movement. The rear end of the yoke is mounted on springs that are fixed to the ring. The yoke is slightly below the plane of the steel ring. This ring is a part of a huge ball bearing and constitutes the cone, the cup or race being secured to the bottom of the chassis frame, and between the cone and cup are 98 $\frac{3}{4}$ -inch steel balls. A dust washer protects the bearing. When the bearing is locked and adjusted the front wheel can be turned with remarkable ease, yet it is rigidly held. The stresses of road shock are taken by the springs at the rear end of the

The trailers of this installation are three-wheeled, the two main rear wheels being of wood, and are mounted on Hyatt roller bearings on fixed axles. The single forward wheel is iron and is caster-mounted on a cup and cone bearing of special design. The axle is on roller bearings. These bearings were necessary to insure ease in handling. Chains are fitted at the front and rear of each trailer at the corners of the body, with a combined hook and ring at the intersection of each pair. The trailers, when loaded, weigh one ton each. When coupled in trains of 12 they track perfectly.

In daily service the tractor and trailers are used in 12-foot alleys, turning right angles to left and right so that the middle section of a train is being drawn at an angle of 90 degrees to the end sections. The train may be turned in a 16-foot alley, so that a part of it may be moving in the opposite direction to the other sections. The trailers are without special fittings for hoisting by the elevator.

The Trailer Dumping Elevators.

The accompanying illustration of the elevator shows the process of dumping the contents of a trailer. Three elevators are used. These are structural steel towers mounted on flanged wheels that are adapted for use on rails that parallel the tracks on which the freight cars are located. The elevators may be driven along the rails by electric motor, the power being taken from three overhead wires by trolley poles that do not appear in the illustration. The power is transmitted through metal conduits to a controller box, that



The Bulley Tractor, Which Can Be Turned in Very Short Radius, Showing the Turntable Mounting of Forward Wheel.

is seen, in the illustration, at the right of the operator.

The electric motor is an induction type that develops 10 horsepower at 900 revolutions a minutes, driving by worm and gear a shaft extending across the elevator frame. A chain from this shaft drives the elevator in either direction, according to the position of the switch above the operator's left hand, and the clutch, the lever of which is at the right. The operator is shown standing with his left foot on a quick-acting brake that will stop the elevator almost instantly. On the shaft carrying the clutch, etc., for driving the elevator on the track, are keyed two pinions that engage with two gears, one of which drives each of the parallel chains to which a wire rope leading to the cage is attached.

The Hoisting Apparatus.

The chains move simultaneously, to afford a positive and limited motion to the cage, and to retard its motion at the top and bottom. The upper chain sprockets are adjustable to compensate chain stretch and to adjust the vertical movement of the cage, which is from the top of the upper sprockets to the bottom of the lower sprockets, and in this construction is 14 feet six inches. The cage is adjusted for position by a turnbuckle between the wire rope and the bridle connecting it to the chains.

The cage is a steel frame, having three tracks to carry the wheels of the trailers, that is guided by wheels rolling in two vertical channels. The trailers are brought to a platform beside the track on which the elevator is located, and they are one by one pushed from the platform to the tracks of the cage. Spring bumpers at the rear and a slight depression of the rail beneath the caster wheel sufficiently secure the trailers in the cage. When the motor is started the cage increases its velocity until it reaches a maximum of 60 feet a minute and then continues at this speed until the upper rear end of the trailer reaches a point opposite the apron on which the load is to be dumped. There it is engaged by a balanced pivoted angle so the motion of this end of the trailer is arrested and the two main wheels roll toward the front and the front end of the trailer is raised. As rear end of the trailer

is stationary the body is partly inverted and held as the bridle passes over the lower sprockets. The time of dumping is regulated by the size of these sprockets.

Capacity 60 to 70 Trailers an Hour.

The contents of the trailer bodies are discharged by gravity and from 60 to 70 can be handled an hour. When discharged, the motion of the cage is reversed and the trailer righted and lowered. The two tracks for the main wheels of the trailers are pivoted at the front and when the cage is raised a leg drops from each track. As the cage is lowered these legs strike and elevate the rear ends of the track so that the trailer is automatically forced from the cage to the platform, and as the wheels leave the cage they trip levers that throw the legs and the rails will become level and ready for the next trailer. The principle of the entire construction is balancing the loads, so that couplings are not used and time is not necessary to handle the trailers.

The position of the elevator can be changed as frequently as desired and the loads of the trailer train discharged wherever will best convenience the loading of the freight cars. This economizes handling to a large degree. The tractor normally hauls from eight to 12 trailers, the loading being done at the pens and alleys, and the trains made up, so that the tractor is worked hauling the trains, either loaded or empty, with practically no loss of time. With this system the shovel men can always have sufficient work ahead of them, and because the trailers are low they can be loaded with much less exertion and more quickly. In trials made without the knowledge of the workmen, to obtain average conditions, a single tractor with 24 men,



The Mobile Electric Elevator That Lifts a Trailer, Dumps Its Contents into a Freight Car, and Returns It to Platform.

including the driver, helper, elevator operators, etc., has done as much work as could be done with 22 two-horse teams and 35 drivers, shovel and dump men.

No statement is made of the comparative cost of disposal and cleaning by the old and the new system, but the saving is stated to be a very large percentage of the expense of the former method of disposal.

JULY EXPORTS HARDLY AFFECTED.

Automobile exports for the month of July, 1914, are only \$500,000 less than the corresponding month of the previous year, the actual figures being \$1,736,253 in 1913, and \$1,249,819 this year. For the seven months ended with July last, there was a corresponding decrease compared with the same period of 1913, the exports having dropped from \$17,760,733 last year to \$16,818,422 this year.

There was a slight increase in the exports of commercial vehicles for the month of July, these having increased from 44 in July, 1913, valued at \$103,612, to 50 this year, valued at \$106,400. However, for the seven months period there was a decrease from \$1,150,649 in 1913 to \$648,241 this year.

Gasoline exports show a remarkable increase of 70 per cent. for the seven months period, jumping from \$7,445,589 last year to \$12,621,406 in 1914. Tires decreased from \$379,273 to \$341,617 for the months of July, 1913, and 1914, and for the seven months period decreased from \$2,545,169 to \$2,102,092.

There was a corresponding decrease in motor car imports. For the month of July, 1913, these were \$81,678, and for July, 1914, were but \$26,168. For the full seven months they decreased from \$768,521 to \$178,631. There was a large increase in imports of parts, these for the seven months being \$151,856 in 1913 and \$602,829 in 1914.

WISCONSIN ENGINE SALE SET ASIDE.

The sale of the bankrupt Wisconsin Engine Company, Corliss, Wis., has been set aside on the petition of the Bosch Magneto Company and the Titusville Forge Company, who represented that the company's creditors had not received due notice of the sale, including themselves. The plant brought \$120,000 and the referee's fee was \$1200.

N. F. Sutton has taken the management of the St. Louis branch for the General Motors Truck Company of Pontiac, Mich., succeeding C. M. Packham. Mr. Sutton was formerly at the Mitchell branch at Dallas, Tex., and has been with the General Motors Truck Company for almost a year.

The Schiedel-Thompson Manufacturing Company, Indianapolis, Ind., has changed its name to the Metal Auto Parts Company. The management and stockholders remain the same as in the old company.

TWO-SPEED ELECTRIC TRUCK.

The Purity one and two-ton electric trucks have a two-speed sliding gearset placed between the motor and the rear axle. These trucks are made by the St. Paul Bread Company, St. Paul, Minn., and, while originally intended for the company's own use, the shop equipment is sufficient for the company to accept outside orders. H. R. Kelly, formerly of the Studebaker Corporation, Detroit, Mich., is the designer.

The two-speed gearset is a unit with the electric motor and the rear axle, the latter being a floating design, that is driven by a worm and worm wheel. The unit is carried on a triangular sub-frame, which is attached to the axle at two points, and pivoted to a cross-member to the frame of the apex by a globe joint.

The worm runs on Hess-Bright radial and thrust bearings, and the wheels on Timken bearings. Both the one and two-ton machines have 102-inch wheel-base and 36-inch Schwartz wheels. The springs are vanadium steel, the front members being 40 by 2¼ inches and the rear 46 by 2¼ inches. Westinghouse four-speed controllers and Ross steering gears are included in the equipment. Both machines are built for a 20 per cent. overload.

SAY FORD SEEKS U. S. L. PLANT.

Statement is made that the company that will take over the plant of the United States Light and Heating Company, Niagara Falls, N. Y., and manufacture low-priced electric cars, is to be headed by Henry Ford and Thomas A. Edison. The company owning the plant is now in the hands of a receiver.

Frank Engle, superintendent for the company, would not confirm the statement, but said that the Willys-Overland Company had placed an order with the company for 50,000 batteries.

M. L. Pulcher of the Federal Motor Truck Company, and P. D. Wagoner of the General Vehicle Company, have been added to the commercial vehicle committee of the National Automobile Chamber of Commerce, the other members of which are Windsor T. White, White, chairman; Alvan Macauley, Packard, and H. Kerr Thomas, Pierce-Arrow.

A St. Louis section of the Electric Vehicle Association of America has been organized with C. E. Mitchell, chairman, F. E. Stevens, vice chairman, and H. B. Marshall, secretary.

The Ahlberg Bearing Company, Chicago, Ill., has opened an office and factory in Los Angeles, Cal. This company makes a specialty of regrinding annular ball bearings.

WIRELESS EQUIPPED MUNICIPAL TRUCK.

DECIDEDLY unusual equipment has been provided for a White chassis that is in the service of the electrical commission of the city of Baltimore, Md., which is utilized by the department in the maintenance of the municipal system of electrical conduits. The chassis is of a standard type and on it is installed a body of semi-enclosed construction that is so equipped that the machine is what may be termed a general service wagon. While used for transporting repair crews and supplies, it is also rigged as a portable pump, carries a complete set of tools and it has an independent lighting plant and a wireless telegraphy outfit, so that communication can be maintained between the office and the machine.

So far as is known this is the first vehicle used by a municipality that has wireless equipment, and the purpose is to economize the time of the men and to better the service by insuring quick response to emergency calls. In the service the machine has given extremely satisfactory results and has proven to be unusually economical, for unnecessary driving has been obviated and the men can always be sent wherever wanted without delay.

The body was constructed in conformity with plans devised by the electrical commission. Hinged entrance doors, one on either side, greatly facilitate the operation of the equipment, while hinged double doors in the rear provide a ready access to various enclosed compartments used for storing suction hose and other equipment. The overhanging hood also forms a locker compartment.

In the rear of the driver's seat is mounted a gasoline driven centrifugal pump, which can exhaust water from manholes at the rate of 12,000 gallons an hour. For the sake of economy the pump is not driven by the 30-horsepower truck engine, but is directly connected to an independent four-horsepower gasoline marine engine. The pumping engine, however, is cooled from the same source as the larger engine. Water is pumped from the bottom of the truck radiator through flexible metal hose to the marine engine and returned to the top of the radiator after circulating around the cylinders of the truck engine. By this method of cooling the cylinders of the marine engine are always kept warm, which, of course, greatly facilitates starting, especially in cold weather.

The suction of the pump is connected through a priming device to three three-inch gate valves by an iron pipe line

suspended under the body. One valve is placed on either side of the body below the side doors, and one in the rear. In this way a hose connection can be obtained, regardless of the location of the manhole, without violating traffic regulations. These valves are set at an angle of 45 degrees with the street surface to avoid unnecessary bends in the suction hose.

The pumping engine also operates a small dynamo which, in addition to furnishing ignition for the marine engine, supplies sufficient current for illuminating manholes. By the aid of the portable lamps, which can be plugged in on the dynamo current, duct chambers may be examined for a distance of 50 feet.

In regard to the wireless station it should be said that the truck service is a receiving station only. The antenna is suspended immediately under the roof of the car and is made of approximately 425 feet of No. 14 stranded, rubber insulated, copper wire, which is laced back and forth until 40 wires are obtained with a separation of one inch. The aerial is inconspicuous and well protected.

A series of rigid tests prove conclusively that the equipment is entirely practical and that excellent results can be obtained, through the aid of a simple code of signals without resorting to the employment of trained wireless operators. It was also demonstrated that direct earth connection was unnecessary, inasmuch as the iron framework of the chassis serves admirably as a counterpoise ground, so that messages can be received by the truck while in motion.

During the preliminary tests the station never failed to intercept any message sent to it within a radius of 10 miles of the sending station, and even under the most unfavorable conditions, with the truck running at full speed and blanketed by tall buildings of steel construction, the messages were easily read.



White Chassis Fitted with Special Body and Equipment, Including Wireless Telegraph Receiving Station, Built for the Electrical Commission of Baltimore, Md.

LOAD ORE WITH TRUCKS.

California Magnesite Miners Ship by Panama Canal to Atlantic Ports.

Magnesite, a magnesium carbonate, extensively used in metal and chemical manufacturing, had been, until the outbreak of the European war, imported from Austria. Large deposits of this material exist in that country and the conditions are extremely favorable for mining it. The cost of labor and transportation to the coast ports is small compared with the expense for work of similar character elsewhere, and this has been one of the principal reasons why no serious competition developed for the Austrian mine owners.

The cost of ocean freights from Europe to America has always been more than for the transportation of similar tonnage from America to Europe, and when the expense of freightage from the European continent by vessel is contrasted with the rate exacted by American railroads, there is no reason to doubt the wisdom of American industries importing not only magnesite, but many other commodities and materials.

A very large and valuable deposit of magnesite exists in California, but the cost of mining and freight across the continent was such that it could not be profitably operated in competition with the Austrian mines until Austria and Germany declared war. Two weeks later the opening of the Panama canal made possible shipments by water from the Pacific coast to the Atlantic ports at a very much reduced price, and immediately the California company was looked to to supply what had been shut off by the cessation of Austrian mining and shipping from Austrian ports.

The first freight steamer to pass through the Panama canal from west to east was the *Nebraskan*, and the cargo carried included a big supply of magnesite, consigned to New York. The transportation of the

ore from the mines to the steamer was necessarily done quickly, and for this work a fleet of Jeffery Quad trucks was utilized. Had not the machines been used the shipment would have been much smaller or the sailing of the steamer delayed, and one of the main objects of both the mining company and the consignees was to get the ore to New York at the earliest possible date.

BIG MILEAGE ON DISTILLATE.

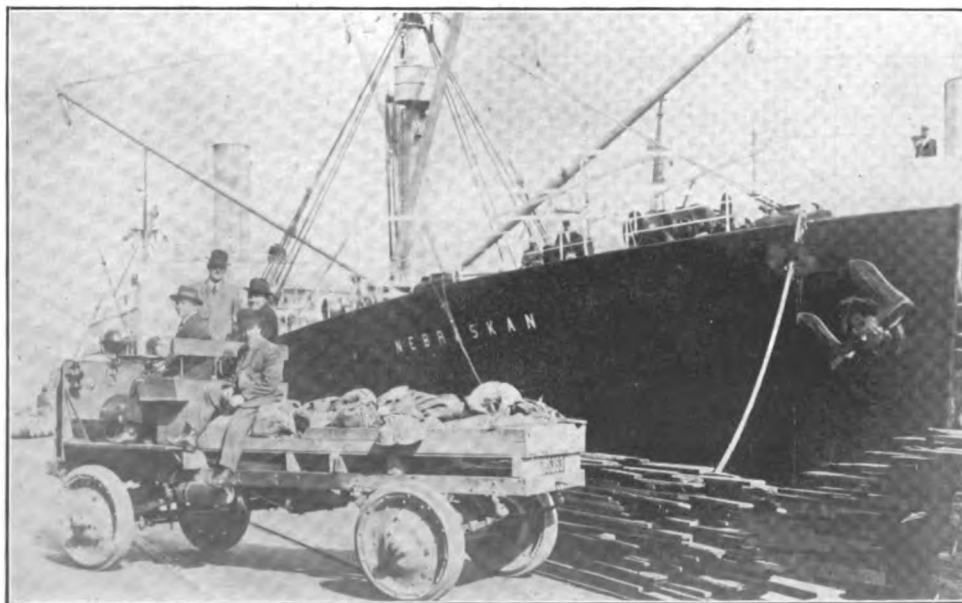
In a recent endurance competition for freight carrying vehicles held in southern California, several machines complied with all the requirements of the contest and were not penalized. One of these perfect scores was made by the driver of a KisselKar 1500-pound wagon, but in addition to this the machine attracted considerable attention from the fact that it had been driven 204 miles with 14½ gallons of distillate. With this very cheap and supposedly less efficient fuel the wagon had averaged 14.07 miles to the gallon for the distance. Nothing was sacrificed so far as power was concerned, as may be judged from the fact that the KisselKar was the first vehicle to complete the contest.

DENBY TRUCK TO CIRCLE GLOBE.

A 1500-pound Denby truck, made by the Denby Motor Truck Company, Detroit, Mich., has started on a trip around the world which, it is estimated, will require two years to complete. This will be the longest and most extensive motor truck demonstration and business trip ever attempted with such a vehicle.

C. T. Chenevert and Beckwith Havens, export and assistant export sales managers, respectively, will be in charge of the truck. From Detroit the trip will be via Chicago, Davenport, Omaha, Kansas City, Denver, Salt Lake City, Stockton, Los Angeles, and then along the coast to Vancouver. From this point the truck will be shipped to Honolulu, and then to New Zealand, the Australian continent, Dutch East India, India, Strait Settlements and Japan.

Before visiting Europe a tour of the various countries of South America will be made. The truck is specially fitted with all that is necessary for camping and outdoor life. This provision has been made so that the crew will be able to undertake journeys overland between demonstrating points long distances apart and have shelter during night stops.



Jeffery Quad Truck Hauling Magnesite from a California Mine to the Steamship *Nebraskan*, for Shipment East Through the Panama Canal.

BRASIE 1915 TRUCKS, PACKET CARS AND TRAILERS.

TWO types of motor vehicles, a wagon having 4000 pounds capacity, and a cyclecar having 400 pounds capacity, are now being produced by the Brasie Motor Car Company, Minneapolis, Minn., a corporation which has succeeded to the business of the Brasie Motor Truck Company. For several years the Brasie Motor Truck Company built machines for a locality market, these being known as Twin City trucks. The satisfaction obtaining with them was such that larger operations were projected, the company was reorganized with capital of \$100,000, and a parcel delivery machine was designed to meet the demands for a light vehicle that could be operated inexpensively.

The Brasie truck has been built and used in the northwest for about four years and the design has been continued practically unchanged, but the purchaser now has the option of a two-cylinder or a four-cylinder power plant, there being an additional charge for the latter. But until the reorganization all Brasie trucks were fitted with two-cylinder engines with bore and stroke of five inches, these being rated at 25-30 horsepower.

The claim has been made for the Brasie trucks that they were extremely simple, had sufficient power to meet all operating requirements, and the location of the engine beneath the footboards gave ample loading space with a short wheelbase, this being a very satisfactory quality in operating in traffic.

Type of Power Plants.

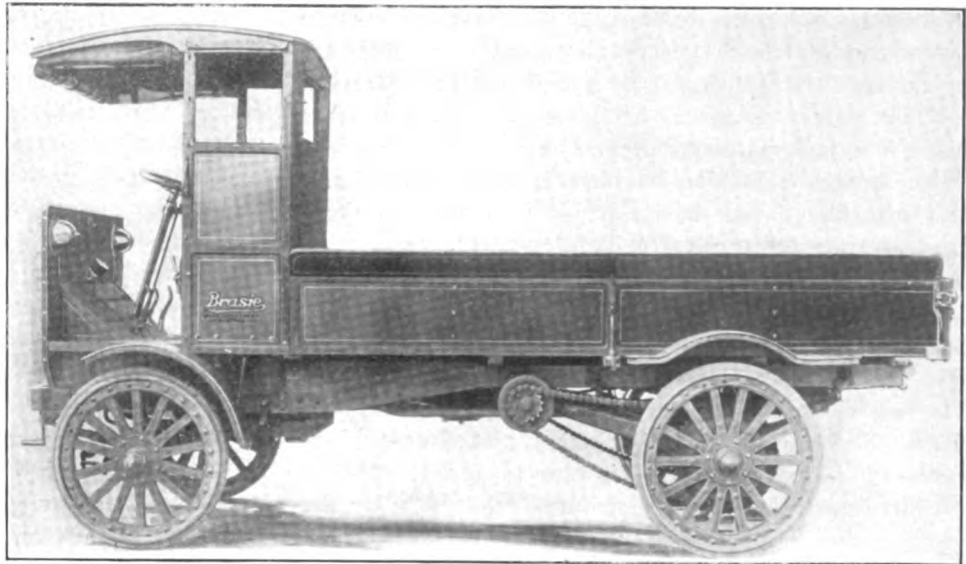
The two-cylinder motor is a water cooled, four-cycle opposed type, that is rated at 25-30 horsepower, but the four-cylinder four-cycle water cooled engine is a Continental construction and is claimed to have capacity in excess of the rating of the two-cylinder. Either type of engine does not differ from standard practise. The water systems are ample to insure adequate cooling, the radiators being large and the circulation positive. The lubrication is by a mechanical force feed system, the supply of lubricant passing through sight gauges on the dash and being always under the observation of the driver. The fuel is carburetted by an automatic float feed type of carburetor that is said to insure uniform and economical mixtures in all conditions of operation. The ignition is by a K-W high-tension magneto.

The power is transmitted by shaft and jackshaft and side chains to the rear wheels. The two-cylinder power plant is mounted in the chassis, so that it is readily accessible. The chassis frame is built of

pressed steel channel section, and it is carried on semi-elliptic springs, 42 inches length and $2\frac{1}{2}$ inches width forward, and 48 inches length and $2\frac{1}{2}$ inches width rear. The front axle is a steel drop forging $1\frac{1}{2}$ by $2\frac{1}{2}$ inches, and the rear axle is a rectangular drop forging $1\frac{3}{4}$ by $2\frac{3}{4}$ inches. The carrying capacity of these axles is said to be more than double the requirements when the vehicle is loaded with two tons. The wheelbase is 104 inches and the tread is 56 inches. The wheels are wood, the forward set being 34 and the rear set 36 inches diameter. These are fitted with solid single band tires three inches and $3\frac{1}{2}$ inches widths respectively.

General Construction Detail.

The machines are driven from the right side and the steering gear is a Ross irreversible screw and nut type designed for truck service. The chassis is fitted



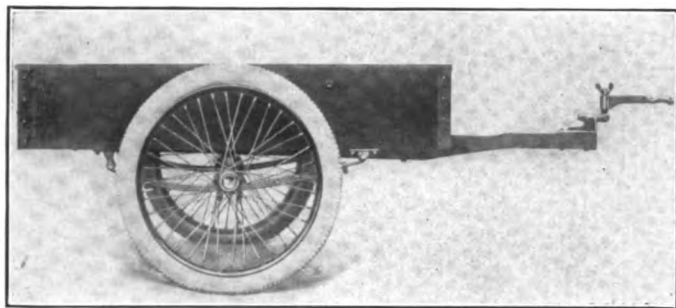
The Two-Ton Brasie Truck, 4000 Pounds Capacity, of the Type Equipped with a Two-Cylinder Opposed Motor, with Cab and Express Body.

with two sets of brakes, the service set, operated by foot pedal, having internal expanding shoes in drums 10 inches diameter and two inches face on the jackshaft, and the emergency set, operated by hand lever, has internal expanding shoes in drums 14 inches diameter and three inches face on the rear wheels.

Care Given to Lubrication.

Much care is given to lubrication of all moving parts, there being no less than 40 grease cups on the chassis besides the usual provisions for oiling. The gasoline tank, with capacity of 10 gallons and fitted with sight gauge, is located on the dash. The road clearance is 10 inches and the loading space with standard construction is 120 inches length and 48 inches width. The weight of the chassis is approximately 3000 pounds. The company has its own body building department, and is prepared to furnish stock or special bodies.

The cyclecar is given the trade name of "Packet"



The Brasie Trailer, Capacity 400 Pounds, Adapted for Attachment to Any Pleasure Car Chassis for Occasional or Constant Use.

car, and this is a very simply built machine that is equipped for carrying loads up to 400 pounds. The chassis has a four-cylinder, water cooled motor, with cylinder bore of $2\frac{1}{2}$ inches and stroke of four. The motor is cast en bloc, with the water jackets integral. The cooling system is large because of the comparatively high speed of the engine. The lubrication is by a combination force feed and splash system, the oil reservoir in the base having capacity for sufficient lubricant for at least 400 miles. The carburetor is an automatic float feed type that is stated to be very efficient, and the ignition is by a high-tension magneto.

The power is transmitted by shaft and friction discs to a jackshaft and thence by V belts to pulleys on the rear wheels. The driving disc is 12 inches diameter, the fiber-faced driven wheel is 15 inches diameter, and the belts are $1\frac{1}{4}$ inches width. The frame is three-inch channel section steel and it is mounted on semi-elliptic springs. The axles are dropped $3\frac{1}{2}$ inches to afford a low centre of gravity, and they are fitted with ball bearings for the 28-inch wire wheels. The wheels are equipped with three-inch pneumatic tires. The wheelbase is 96 inches and the tread 44 inches. The road clearance is nine inches.

The machine is driven from the left side by the conventional hand wheel, and the service brake is internal expanding, the shoes operating within drums eight inches diameter on the rear wheels. This brake can be set with a ratchet. The reverse of the driving system can be used as an efficient emergency brake. The gasoline tank is carried on brackets directly back of the dash, it being very convenient for filling, and sufficiently high to insure good gravity feed of the fuel to the carburetor.

The cars are equipped with enclosed bodies that open at the rear, these having hoods that extend forward to the dash lines and, with ample side panels, afford protection to the driver. The load space in the body is $28\frac{1}{2}$ inches width, $51\frac{1}{2}$ inches length and 48

inches height. This will allow a capacity load of bulky, but very light goods.

Brasie Pleasure Car Trailer.

The Brasie trailer is designed for use with the average pleasure car. By permanently installing a simple bracket on the rear of the chassis frame of the car a trailer may be quickly coupled and used wherever desired, this affording sufficient carrying capacity and not encroaching upon the passenger space of the vehicle. The trailer is constructed to use an open body, but this can be covered with a tarpaulin or other water proof in the event of storm. Primarily it consists of a solid round steel axle $1\frac{1}{4}$ inches diameter, which is fitted with a pair of 28-inch wire wheels shod with three-inch clincher pneumatic tires. The tread is 56 inches. On this is mounted a pair of semi-elliptic springs 36 inches length and $1\frac{1}{2}$ inches width. On these is installed a body 52 inches length, 43 inches width and nine inches depth, the forward ends being pivoted at the eyes on hangers, and the rear ends are shackled to brackets.

The body is strongly constructed, having hard wood bottom and reinforced corners. From the centre of the body extends forward a wood pole, on the end of which is placed a fitting that is designed to engage with the permanent bracket on the car chassis. This fitting is so designed that when the trailer is attached there is a universal movement, eliminating all but the towing stresses. The trailer can be attached or detached in a minute, the coupling being made by a wing nut. The construction of the trailer is such that it can be used with any vehicle and can be drawn at a fast speed. The weight is 250 pounds.

D. K. Moore, sales manager of the Weston-Mott Company, Flint, Mich., has been appointed sales manager of the Northway Motor Company, Detroit, Mich., and of the Jackson-Church-Wilcox Company, Saginaw, Mich., in addition to his other duties.



The Brasie Packet Car, Capacity 400 Pounds, Having Four-Cylinder Motor, and Driving Through Friction Discs and Belts.

MANY ENGLISH PLANTS BUSY WITH ARMY WORK.

SINCE the beginning of the European war, and following the recovery from the unsettled conditions that marked the first two weeks of August, the American manufacturers have been seemingly engaged in considering possibilities rather than undertaking to develop them, and the fact cannot be denied that while the industries and commerce of Germany are paralyzed, and business in France has for the time being ceased, England is not only seeking to continue its own industries and commerce, but has already entered into an aggressive campaign to acquire whatever German export trade it is in a position to supply.

London has for more than a century been regarded as the money market of the world. It has not lost that prestige, and the only question appears to be whether the nation can engage in an enormously destructive and expensive war and yet continue to carry on its world-wide commerce. The British navy is so distributed as to control the seas; its numerous lines of communication have been restricted or rearranged to meet the demands for vessels for military transportation, but the men in control of the industries have sought systematically to continue production, at least to meet some of the demands of other nations. In fact, the continuance of exportation is a part of the national policy, and government assistance is given wherever conditions justify.

The American manufacturers are governed in their activities by financiers, and the financiers are doubtful as to the stability of the markets of other nations, and the business men of neutral foreign countries are in turn limited by their own resources, so that there is apparently an endless chain of situations to be solved. Meantime, England is preparing to make the most of the opportunity. Germany's markets in Russia (a very large purchaser), France, England and Belgium have been destroyed. Austria can no longer be a purchaser, and there is little probability that Italy, Spain, Sweden, Norway or Turkey will engage in commerce to such an extent as to be regarded as a serious factor.

But there is no doubt that the United States is looked to logically by most nations to supply necessities, provided, of course, that the American bankers and manufacturers are willing to undertake a part of the responsibility that must necessarily be assumed with reference to transportation, financing, etc.

Of special interest at this time is the status of the automobile vehicle industry of England. English motor vehicle builders have not, in previous years, built a sufficient number to meet the home demand. The nation has imported more than any other in Europe. The criticism has frequently been made that the industry has been too conservative, and that the possibilities of the foreign markets have been too greatly neglected. The fact that the industry has never been regarded as being strongly competitive in the markets of the world is a condition to be considered, and be-

cause of the necessity of supplying domestic demands only an uncertain surplus, if a surplus exists, can be diverted to exportation. For this reason there is much significance in the reports that have been made by some of the largest concerns in the motor vehicle industry, especially those that produce motor trucks and wagons.

For instance, John I. Thornycroft & Co., Ltd., states that it has contracted to produce vehicles of the subsidized type for the government. Because of the loss of men who have been sent with the army into France the company has not its full productiveness.

Saunderson & Mills, Ltd., states that its plant is working full time with the workers available. The company is not advising its employees not to enlist, and all who have enlisted have been assured of employment when they return. The company expresses the hope that the government will remove the restriction on the exportation of tractors. If this prohibition is removed the company expects to continue operating during the war, providing that it can obtain raw material.

A great influx of orders for chain gears for vehicles, both from the government and the leading manufacturers of trucks, has been received by Hans Renold, Ltd. Hans Renold, in addressing his employees, said that during the month of August orders were practically equal to those received during the same month of the previous year. There is a great rush at the present moment, and indications are, he said, that this will continue. The Aster Engineering Company, Ltd., is working time and a half on aeroplane engines, searchlight sets, Marconi sets, workshop equipments, naval pinnace equipments and pumping installations, besides commercial vehicle engines.

The business of the Yorkshire Commercial Motor Company has increased in both home and foreign markets. It has no government orders on hand at the present moment, except for the India office. The Leyland Motors, Ltd., reports that at the present moment all of its output is being taken by the government. It will take until the end of the year to satisfy the wants of the army. This concern is working a full night shift and has increased its output, the company states, 100 per cent.

From the latest cablegrams received in this country, it is certain that the British truck manufacturers will be busy until the first of the year. At present most of the plants are working day and night shifts to fill orders for the government. Estimate is made that the companies will require until January, 1915, to complete these orders. At the same time, the firms who have had motor vehicles requisitioned, are clamoring for new equipment, and it would appear that the war has given an impetus to the motor vehicle industry rather than retarded it.

The value of the export business of Germany is a

subject of much interest to American business men. From the following tabulation one will see that there was a marked advance last year in the exportation of industrial motor vehicles from Germany:

	1913	1912
Number of vehicles exported.....	1,999	695
Value of vehicles exported.....	£657,500	£388,650

Exports to different countries:

	Per cent. of total exports	Cwts.	Cwts.
Russia	25	7475	5025
Brazil	13.6	4375	3942
Austria-Hungary	10.7	3191	2212
Roumania	8	2329	998
Turkey	3.6	1077	1067
Servia	3.1	949	.....
Finland	3	893	530
Great Britain	2.9	862	476
Holland	2.5	764	210
Italy	2.48	733	919
Argentina	2.3	580	564
United States	1.4	418	314
Switzerland	1.35	390	407
Bulgaria	1.07	315	375
Norway	1	294	152
Greece	1	288	12
Other countries	17	4961	1698

It will be observed that, while there was an increase of over 70 per cent. in the value of the shipments, the number of vehicles exported nearly trebled. This is due to the fact that the demand created was for a lighter and less costly type of machine. An analysis of the above tabulation shows that 65 per cent. of Germany's trade in industrial motor vehicles has been with countries in Europe, Russia taking the lead with 25 per cent.

For some time past the bulk of the Russian orders secured by German builders has been for the Russian government. England is keeping in mind the fact that many more vehicles will be required by Russia in the near future to replace those destroyed or damaged during the war. Obviously, Russia will look to her allies rather than her enemies to supply her future necessities.

After Brazil's 13.6 per cent., Austria is the next market of importance, having taken over 10 per cent. of the German exports. However, it is unlikely that England will secure any of this business. One will note that there ought to be splendid opportunities in the countries where German vehicles were sold, especially when the war has eliminated most of the other nations from these markets. They are all open to the United States.

Champion Ignition Company, Detroit, Mich., has lost its protest over the tariff rate on porcelain insulators for spark plugs. The dispute arose over the fact that on the plugs were printed letters and numbers intended to protect the company's patent rights. For this reason the collector classified them as printed china with a 55 per cent. duty.

A branch factory in St. Catharines, Ont., is being established by the Marathon Rubber Company, Akron, O. The company will erect a \$50,000 plant and employ 100 men at the start.

REORGANIZING MOTOKART COMPANY.

Plans for the reorganization of the Motokart Company, with factories at Tarrytown and Peekskill, N. Y., and general offices at 1790 Broadway, New York City, have been perfected, the purpose being to increase the capital and permit the development of the business with greater economy and profit. The succeeding company will be the Motokart Company, Inc., with \$400,000 preferred and \$600,000 common stock, and it will take over tangible assets of approximately \$100,000 and assume liabilities of about \$35,000, which will leave a balance of about \$65,000, which will be represented by assets of nearly \$72,000. The plan is to underwrite \$100,000 worth of the preferred stock, which is to be offered at 75 per cent. of the par value, with a bonus of 50 per cent. value of common stock, and the funds to be realized will be used for working capital. Preferred stock is to be issued to the old stockholders.

The new company will take over all of the property, the good will, patents, equipment, accounts, etc., and will continue the business on a large scale. A part of the new plant will be occupied shortly after the first of the year which, when completed, will have a floor area of more than 100,000 square feet. This plant and the machine tool equipment are being financed apart from the fund resulting from the underwriting of the stock. When this part of the new plant is in operation the company will be able to produce an average of 10 machines daily. The statement is made that the products of the company are selling extremely well and the increase of business has made necessary the reorganization.

EXCHANGE AUTOMOBILES FOR COTTON.

The Forsythe Motor Company, Atlanta, Ga., distributor of the Stearns-Knight car in that city, announces that it will exchange automobiles for middling cotton, on a basis of 10 cents a pound. This cotton will be held until Feb. 1, 1915, and if at that time it can be sold for more than 10 cents a pound, the original owner will receive the increase, less the cost of holding. Should it bring under that price the company suffers the loss.

H. A. Farrington has resigned his position as editor of Power Wagon, Chicago, Ill., to accept the position of publicity manager for the Thomas B. Jeffery Company, Kenosha, Wis. He is succeeded by S. A. Phillips, formerly technical editor of Power Wagon.

C. C. Homan has resigned as purchasing agent of the Willys-Overland Company, Toledo, O. H. V. Hawk has been appointed general purchasing agent of that company, the Gramm Motor Truck Company and the Garford Company.

S. A. E. ANNUAL MEETING IN JANUARY.

The 1915 annual meeting of the Society of Automobile Engineers will be held in New York City during the period of the automobile shows next January. The divisions of the standards committee have resumed active work, and the next convention will be held during November. It is thought that the session will last three days, during which time the reports of the various divisions will be submitted and considered.

TRUCKS A FEATURE AT BADGER SHOW.

The motor truck division was a feature at the Wisconsin state fair at Milwaukee recently. Displays were made of Stegeman, Menominee, Crown, Jeffery, Reo, Kissel, Overland and Buick machines. A Jeffery "Quad" was demonstrated in mud, sand, ruts and hills in a special plot of ground in the fair park, to show its power in different working conditions.

WESTON SUCCEEDS ANDERSON.

Joseph C. Weston has been made general sales manager of the United States Tire Company, New York, N. Y., succeeding J. D. Anderson, resigned. Mr. Weston was formerly central district manager and has been acting general manager for several months during Mr. Anderson's absence abroad.

NEW FACTORY AT KALAMAZOO.

F. A. Young is president of the Safety First Motor Car & Truck Company, which has been formed in Kalamazoo, Mich., to manufacture four-wheel drive motor trucks and cars.

OVERLAND EARNS \$5,864,858 NET.

The Willys-Overland Company, Toledo, O., earned a net income of \$5,864,858 for the fiscal year ended June 30 last. Other items were: Reserve for contingencies, \$300,000; interest on floating debt, etc., \$333,583; total deductions, \$633,584; balance net income, \$5,231,274; preferred dividend, seven per cent., \$350,000; balance for common, \$4,881,274; common dividends, 11 per cent., \$2,200,000; balance, \$2,681,274; provision for retiring preferred stock, \$250,000; surplus, \$2,431,274; previous surplus, \$3,070,959, making a total surplus of \$5,502,233. The balance available for the common stock is equal to 24.40 per cent. on the \$20,000,000 outstanding. This statement is extremely favorable, considering existing conditions.

GREECE BUYS MANY TRUCKS.**Will Equip Its Army Transports with American-Built Chassis.**

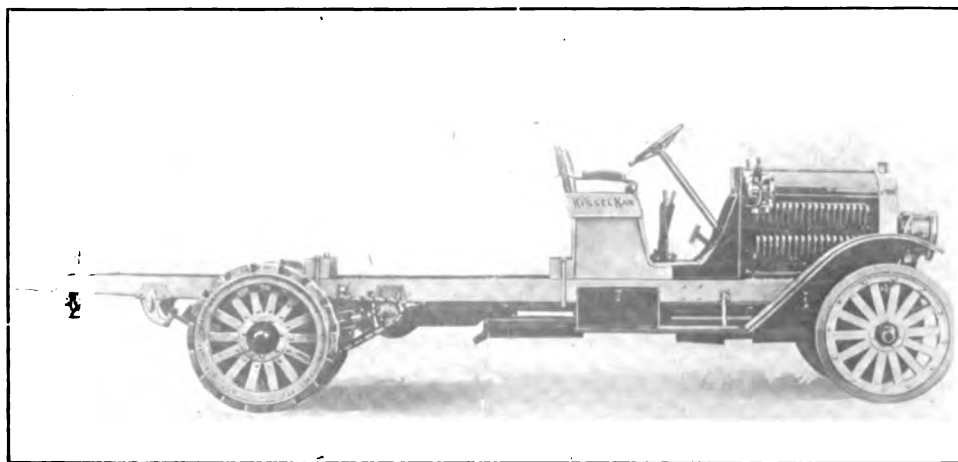
The experience of the Greek government with motor transports during the recent wars with Turkey and Bulgaria, was convincing that this form of transportation was in every way superior to animals, and shortly after the beginning of the present European war, that nation, largely as a provision against the possibility of being forced into the conflict, decided to increase its equipment to a point where it would be able to effectively carry on defensive operations.

To this end the government's agents in America made investigation and its minister to the United States, Agamemnon Schliemann, made contract with the Kissel Motor Car Company, Hartford, Wis., for 50 chassis of 3000 pounds capacity, which are to be delivered in New York as rapidly as possible.

The purpose of the Greek government is to utilize at least 400 machines, which will be of the capacity that has been purchased, and these will be used for the commissary department. There is reason to believe that these will be purchased in the United States, together with stocks of parts that may be necessary for restoration and repair.

The condition of the roads in the Balkan states, and, in fact throughout southern Europe, is such that smaller units are regarded as being superior for the army service, and so far as possible machines of practically 3000 pounds capacity will be utilized. During the wars in which Greece was engaged in 1912 and 1913, the government took over first practically all the motor vehicles in the country, a comparatively small number, and later on bought French and Italian vehicles, which, although driven by inexperienced men, and neglected because of the lack of capable mechanics, made possible operations that could not be undertaken with any other form of transportation.

The KisselKar trucks are not specially built. They weigh 4400 pounds each, have a 132-inch wheelbase,



Chassis of a KisselKar 3000-Pound Truck, 50 of Which Have Been Purchased by the Greek Government for Equipment of Its Army.

tread of 57½ inches, and have four-cylinder motors with 4½ inches bore and 5½ inches stroke. Each chassis shipped to Greece is to have a standard truck platform body with loading space 120 inches length and 66 inches width. The Kissel factory is now being operated with day and night forces of men to expedite the order.

LOZIER COMPANY IN BANKRUPTCY.

L. E. Joslyn has been appointed referee in bankruptcy for the Lozier Motor Company, Detroit, Mich., by the United States district court. The involuntary petition against the Lozier company was filed by the Pressed Steel Company, the Welded Steel Barrel Corporation and the Brightman Nut & Manufacturing Company, all creditors for \$1000 or over.

According to the company's attorney the Lozier company does not admit itself insolvent. On Dec. 31 the financial statement of the concern showed assets of \$4,067,051 and liabilities of \$1,572,667. The capital stock of the company consists of \$2,500,000 in common and \$500,000 seven per cent. preferred.

SEEK CHEAPER POSTAL RATE.

Postmaster-General Burleson has a plan under consideration to establish a straight two-cent letter postal rate effective throughout the Western Hemisphere. This will bring South America within the two-cent zone and will help stimulate trade between the two countries. In addition a plan for the establishing of money order branches is also being considered.

IOWA MOTOR LAW DECISION DELAYED.

The decision of the Iowa supreme court on the validity of the state's new motor and vehicle law will probably be held up until January, 1915. The delay is to make possible immediate remedial action, for at the time decision is expected the legislature will be in session.

Earl J. Moon has been appointed advertising manager of the Moon Motor Car Company, St. Louis, Mo. Mr. Moon started in eight years ago working as a mechanic for his father, Joseph W. Moon, president of the company that bears his name.

It is expected that more than 250 agents and representatives will attend the annual sales convention of the Firestone Tire and Rubber Company, Akron, O., Oct. 12-17.

The International Harvester Company, Chicago, Ill., has declared a regular quarterly dividend of 1¼ per cent., payable Oct. 15, to stock of record Sept. 28.

THE BUSINESS OUTLOOK.

While the general condition of business must necessarily be reflected by the motor vehicle industry, there is every reason to believe that there will be quick and enduring improvement, and the general tendency toward economies because of the experiences of the past two years will undoubtedly prompt the utilization of power wagons and trucks because of their obvious advantages. The average motor truck manufacturer does not produce a stock of machines and await purchasers. He builds only to meet such demands as are realized, and while this is undoubtedly more expensive than the construction of pleasure vehicles, it is decidedly the more satisfactory from every point of view. The demand for machines is somewhat dependent upon the requirements of the market, but with the best season of the year at hand, with greater confidence in the resources of the country, and the knowledge that the greatest opportunities for a decade at least are presented, there is every reason to expect remarkable activity of industry and commerce and substantial profits for every interest.

WILLYS BUYS COTTON FOR DEALERS.

John N. Willys, president of the Willys-Overland Company, Toledo, O., has purchased a bale of cotton for each of the 400 Overland dealers in the South. Mr. Willys says it is his intention to buy an additional bale of cotton for each Overland car purchased during the two months ending Nov. 17.

ALLEN COMPANY ELECTS OFFICERS.

The Allen Motor Company, Fostoria, O., has held its annual meeting and re-elected its officers. The company's business for the past year amounted to \$800,000. The plans are to complete 2000 cars the coming year.

The Automobile Trail Blazing truck, a Bessemer machine, which left New York last June, to establish a trail direct from New York to Seattle, is at Sandpoint, Ida., having reached as far west as Spokane. The crew of the truck will return east to Missoula, Mont., and remain there for the winter.

The Exchange Motor Car Company, Los Angeles, Cal., is selling used cars, and offering the same guarantee that dealers in new cars offer. Likewise the company gives day and night service to purchasers of pleasure cars or trucks.

Howard E. Coffin, vice president of the Hudson Motor Car Company, Detroit, Mich., has been appointed a member of the patents committee of the National Automobile Chamber of Commerce.

MOTOR TRUCKS IN MUNICIPAL SERVICE.

Dumping Body Machine for Combination Work and Street Sprinkling Purchased for Butte, Mont.—Fire Department Equipment in Great Demand.

COMBINATION equipment, that may serve for two or more purposes and may be utilized for work that is dependent upon or governed by climatic conditions, has especial value to the municipality. Such apparatus has large economic possibilities for the comparatively small city or large town, because if it may be worked constantly it will be more productive than if used but a part of the time.

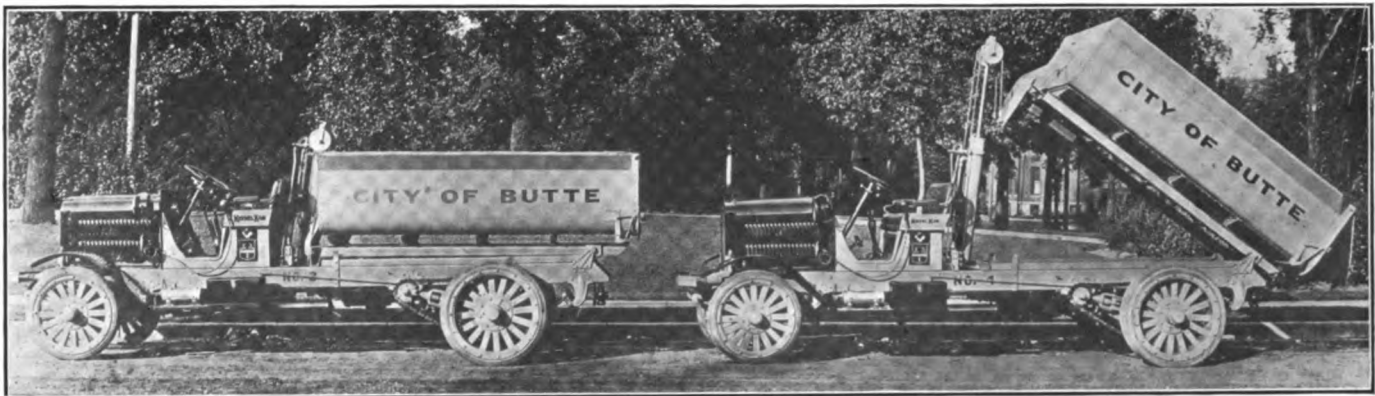
There is a tendency of municipal administrations to do public construction, maintenance, and to afford departmental service with equipment that is designed or adapted for these works, and as contractors generally are unwilling to acquire the most economical facilities unless they can use them to a profit, and will not willingly enter into short term contracts that are not sufficiently remunerative, the large town or small city can very profitably buy what can be used the year through.

This policy has been adopted by the city of Butte,

The bodies are seven cubic yards capacity and are constructed of three pieces of 3/16-inch steel plate, stoutly reinforced with angle steel frames. They are built with rounded bottoms so that loads of wet material may be dumped readily.

The bodies are mounted on hinges at the rear of the chassis frames and they are lifted by hydraulic hoists that are operated by circulations of oil forced through them by gear driven pumps that are actuated from the main driving shafts and controlled by hand levers convenient to the drivers' seats. These hoists will elevate the bodies to angles of 50 degrees. The bodies are so designed that the loads may be distributed on the road surfaces, the end gates opening automatically when an angle of 20 degrees has been reached by the body. The trucks replace six teams of horses and wagons or carts and six men, this being a saving of the labor of four men.

The street sprinkling apparatus consists principally



Two Kissel-Kar 7000-Pound Trucks with Special End Dumping Bodies and Hydraulic Hoists, Used by Butte, Mont., for Hauling Highway Construction Material and Collecting Garbage.

Mont., which has recently acquired three Kissel-Kar truck chassis that are fitted for service of differing kinds, so that they can be worked practically the entire year, and affording the fullest measure of economy from these machines in whatever service they are engaged.

The chassis are the standard 7000-pound load capacity constructions, and the intention is to work two of these in highway construction and cleaning, snow removal, and the like, and the other is to be utilized for street sprinkling during a part of the year and for general work the remaining months when this service is not required.

Two of the chassis are equipped with quick dumping bodies for the haulage of gravel, sand, cement, paving block and the like during the period of the year when construction can be carried on, and at other times these will be used for the collection of garbage.

of a 1000-gallon steel water tank that is mounted on the chassis, and this may be hermetically closed to obtain whatever pressure is desired for operating it. A two-stage centrifugal water pump is installed on the chassis and this is driven by the main driving shaft, being connected by a clutch that is controlled by the driver. The pump is connected with tank by a 2½-inch pipe. From the tank a discharge pipe is extended that has two outlets, one of which serves the sprinkler heads, which are mounted just forward of the radiator, and one that serves two flushing nozzles, one at either side of the chassis just forward of the front wheels. With this arrangement of the discharge pipes the driver can observe the flow of water at all times and can control it to serve any condition in which the machine may be utilized.

With this apparatus a street 60 feet in width may be thoroughly wetted by driving the apparatus



Power Street Watering Apparatus Owned by Butte, Mont., Sprinkling a 60-Foot Street Its Full Width with One Operation.

through the centre of the roadway, there being sufficient pressure to force water to each sidewalk curb. The contents of the tank will fully wet a surface of a street for seven or eight blocks, the distribution being uniform, which is a much larger area and more even wetting than can be accomplished by the average horse drawn tank wagon, for the pump will supply the pressure of water at a constant until the tank is emptied.

The tank is fitted with connections for attaching standard fire hose to hydrants, and with ordinary city pressure the tank can be filled in two minutes through a 2½-inch hose. It may also be filled at any hydrant, thus doing away with the standpipe, such as is used for horse drawn sprinklers. The machine may be used for fighting fires in outlying districts where there are no water mains. The pump will supply one line of 2½-inch hose, which may be connected to either flusher opening, the pressure being determined by the speed of the motor.

It should be pointed out that the entire machine is operated by one man. The total cost figures are placed at \$15 a day, which includes depreciation at 20 per cent., insurance, interest on investment, gasoline, oil, driver's salary and repairs. As the season the tank is regularly used lasts only six months, the purpose is to make the chassis constantly useful by removing the tank and water pump and replacing them with a steel dump body and hydraulic hoist.

The demonstration required by the mayor and city officials of Butte required the sprinkling of the two main streets at the busiest hour of the day, and when the traffic was heaviest. This was accomplished without wetting anyone on the street, and every foot of pavement that was not in use was sprinkled. The sprinkling nozzles are controlled by hand levers located conveniently to the driver, making it possible to regulate the amount of water passing through the nozzles, or the distance the water is to be thrown at either side. Either discharge outlet is regulated independently. The flusher nozzles are made adjustable, so that the water can be directed at right angles with the machine for washing pavements, or the

nozzle may be turned directly ahead for washing gutters. Likewise, it is possible to turn these nozzles directly under the truck to wash the refuse to the lower curb.

The average pressure on the flusher nozzle is 60 pounds to the square inch, and on the sprinkler heads 35 to 40

pounds. The machine is driven at a speed of 10 miles an hour when used for sprinkling and four and ½ to five miles an hour when in use for flushing.

TO REGULATE DETROIT TAXI STANDS.

With the purpose of giving the police department full control over taxicab and automobile stands, and location of the same, an ordinance is to be presented to the Detroit, Mich., city council. This has already been adopted by the council committee on ordinances.

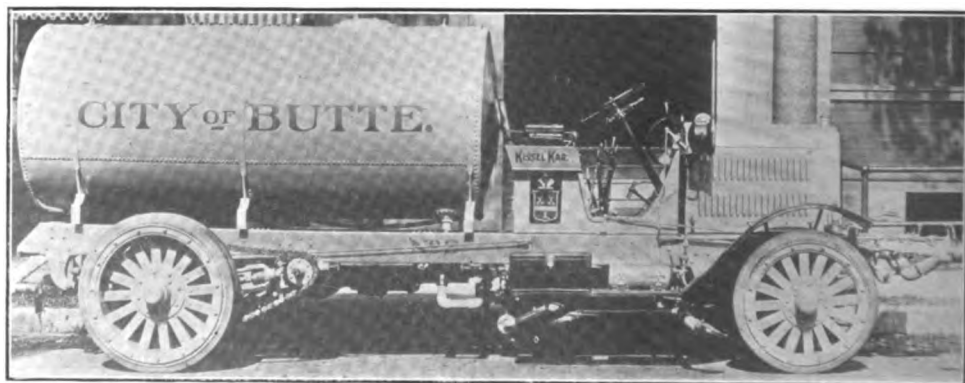
Another ordinance will be submitted regulating the rates to be charged for motor cars rented by the hour. The maximum fare is to be \$3 an hour for a five-passenger car and \$4 an hour for any car seating more than five persons.

NEW YORK WINS TAXICAB STAND FIGHT.

The question as to whether or not taxicabs were to be permitted to stand in front of hotels has been won by the City of New York. Signs are now being placed by the city authorities stating where these machines may now stand, and the number of each.

TO CONTEST SEPARATOR REPEAL VETO.

The dealers and garagemen of New York City will fight Mayor Mitchell's veto of the gasoline separator ordinance. An attempt will be made to have it repealed over the veto of the mayor. This law was repealed by the Board of Aldermen by a vote of 57 to 1, and in order to carry it over the mayor's head a



Kissel-Kar Chassis Equipped with 1000-Gallon Tank and Special Street Watering Equipment That Is in Front of the Machine and Directly Observed by the Driver.

three-quarter vote is required in the Board of Aldermen.

The law as it now stands compels the New York garagemen to install separators in garages.

POPULAR TYPE OF FIRE CHIEF'S CAR.

A new type of fire chief's car, made by the Mitchell-Lewis Motor Company of Racine, Wis., has been delivered to the city of El Paso, Tex. Built on the Mitchell Special Six chassis, with room for five passengers, the car has chemical extinguishers, lanterns, ropes and other small pieces of fire department apparatus ingeniously placed in and about the body. The 4¼x6-inch six-cylinder motor will drive the car at the rate of 70 miles an hour. The makers say they are having considerable call for cars of this special type.

FIRE DEPARTMENT SERVICE NOTES.

The American-La France Fire Engine Company, Inc., Elmira, N. Y., has been awarded the contract for furnishing \$20,000 worth of apparatus for the Cohoes, N. Y., fire department. This will include a triple combination pumping, chemical and hose car, a chassis and a tractor.

A severe test was given a new motor hose wagon recently purchased by the Victoria, B. C., Can., fire department, from the Nott Fire Engine Works, Minneapolis, Minn. The machine attained a speed of 55 miles an hour, hauling 2800 feet of hose and the usual equipment.

It is found that the new speed ordinance limiting fire apparatus to 25 miles an hour in Davenport, Ia., is preventing the department responding to alarms in time to keep the small fires from spreading unnecessarily.

The New Orleans, La., fire department will shortly place into service a motor combination pump and hose wagon and an auto chemical engine bought from the American-La France Company, Elmira, N. Y.

The competitive promotion examination for the newly created position of motor engineer in the Joliet, Ill., fire department, will be held Oct. 8.

A triple combination car recently purchased from James Boyd & Bro., Inc., Philadelphia, Penn., has been placed into service at Stowe, Penn.

Fire apparatus in Holyoke, Mass., is limited to 25 miles an hour going to a fire and 15 returning.

PROSPECTIVE PURCHASERS OF APPARATUS.

A motor combination chemical and hose car will be purchased by the Circleville, O., fire department in

the near future, if present plans do not miscarry.

Chief Thomas Coyle of the Paterson, N. J., fire department, urges the purchase of four tractors and two motor combination chemical and hose cars.

The Waukesha, Wis., fire department has recommended that a motor combination chemical, hose and ladder truck be purchased.

It is expected that the fire department of the city of Leavenworth, Kan., will soon be in the market for an auto hook and ladder truck.

San Luis Obispo, Cal., is considering the proposition of purchasing a combination chemical and hose car for its fire department.

A combination chemical and hose car will be bought for the Warren, Penn., fire department, according to present plans.

The purchase of a number of pieces of fire motor apparatus is under consideration by the Woonsocket, R. I., department.

Canal Dover, O., Hannibal, Mo., Reading Pa., Portland, Que., Warren, Penn., and Wichita, Kan., are to install motor apparatus in their fire departments.



Martin Combination Hose and Chemical Wagon Built for the Fire Department of Collingswood, N. J., and Just Delivered.

A motor combination chemical and hose car will probably be purchased by the Martinsburg, W. Va., fire department.

A motor combination chemical and hose cart will probably be purchased by the Gloversville, N. Y., fire department.

The Cameron fire company of Lewisburg, Penn., may purchase a motor combination chemical and hose car.

The Fostoria, O., fire department contemplates the purchase of a combination chemical and hose car.

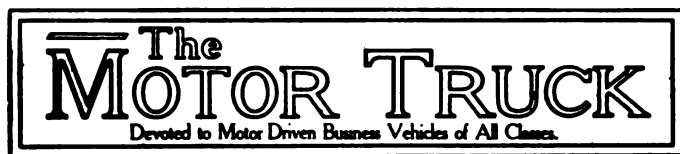
The Murphysboro, Ill., fire department is investigating motor apparatus with a view to buying.

The New Haven, Conn., fire department has asked for an appropriation for an auto pumping engine.

The Shenandoah, Ia., fire department is investigating fire apparatus with a view to purchase.

The fire department of Gainesville, Tex., contemplates purchasing fire apparatus.

Fire auto apparatus may be purchased soon by the Boone, Ia., department.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

PROSPECTS FOR BUSINESS.

The United States is the only large nation of the world not now engaged in warfare. There is reason to believe that this conflict will be continued for a considerable period. The neutral nations, like America, are solving their own commercial and industrial problems and practically all of them are now dependent upon this country for many commodities that were previously purchased in Europe. The longer the war lasts the greater will be these needs, and the industries and commerce of the countries now at war will not become rehabilitated for a long time after peace has been declared.

America can and eventually must produce a great deal of what it now buys abroad. So long as the United States is yielding agricultural crops largely in excess of what its people consume, it will have a market for the surplus in other nations. Its markets for the sale of industrial products are what are made, and these must be developed. But the United States must be so far as possible financially independent, and this position can only be attained by making New York the commercial centre of the world.

PROPOSED TAX ON MOTOR FUELS.

The largest factor in the development of the automobile vehicle industry in this country has been an abundance of fuel at comparatively low price. The relatively higher cost of fuel from internal and revenue

taxes has been the chief retardation of the European industry. Because the consumption of fuel oils is practically equal to, if not in excess of, the production, the price in America has steadily increased. The prospect for fuel shortage has been such that the thinking minds of the nation have advocated the utilization of other and cheaper hydrocarbons, and experiment and research has been directed toward developing means for efficiently carburetting kerosene, alcohol and distillates.

The proposition to tax gasoline is directed principally toward owners of motor vehicles, but it will affect every form of power for which internal combustion engines are used. Pleasure car service can be limited to meet the requirements of economy, but transportation and power cannot be economized without sacrificing business. No greater obstacle could be placed in the way of the progress of not only the industry, but highway transportation, than this specifically vicious and unnecessary taxation.

MOTOR MILITARY EQUIPMENT.

England, Germany, France and Austria have attempted to provide army motor equipment by subsidization, but when emergency arose the demands were so greatly in excess of the machines available that the conditions that subsidizing was expected to minimize or obviate were found appalling. In England, the government has either made contract with motor vehicle builders to produce new machines and parts, or has taken the entire production of factories to supply the needs of the army. This same condition obtains in France and probably in Germany. The great problem is to supply transportation. No preparation made has been found adequate.

This is a lesson that should not be lost to the United States. Should occasion require there should be sufficient transportation equipment available. Standardized vehicles only should be bought, and provision should be made for field repair shops where any work of restoration could be undertaken. Besides this there ought to be sufficient men available whenever required to serve as drivers, mechanics and repairers. Men of ability are necessary for utilizing motor trucks in army service, and they cannot be too carefully trained.

ROAD BUILDING POLICIES.

The value of good highways to the nation cannot be over-estimated, but the great fault now is the wide variance of national, state and municipal policies relative to engineering, construction, maintenance, financing and development. If there is any one subject on which the people of the nation can agree it is highways, but strangely enough there has been no attempt made to unify the varying interests and progress has been prevented without reason.

ELECTRIC VEHICLE PRACTISE.

Principles of Design, Construction and Operation of the Single-Phase General Electric Mercury Arc Rectifier--Battery Charging in Series---The Murphy Mechanical Rectifier and Its Wide Range of Operating Control.

By William W. Scott.

MERCURY arc rectifiers, whether single or three-phase, are practically alike in general principles of design, construction and operation. There is, however, some variance in the detail of the application of these principles. So far as these differences are concerned they are of no consequence to the owner or operator.

For convenient illustration, and the better to establish the principles of operation of a rectifier in the mind of the reader, one may regard the tube as a valve placed in an electric current, that will allow the movement of the current in one direction only, the main reactance being a means of receiving and delaying the current so that there will be no cessation of the flow of current through the valve.

Because of the alternations of the current there must be two or more anodes or positive electrodes, besides the starting anode, and but one negative electrode or cathode. The current always moves from the positive electrodes through the mercury vapor to the negative electrode. The current cannot be reversed, although it may be stopped by the establishment of negative electrode resistance. This negative electrode resistance serves practically as would a valve.

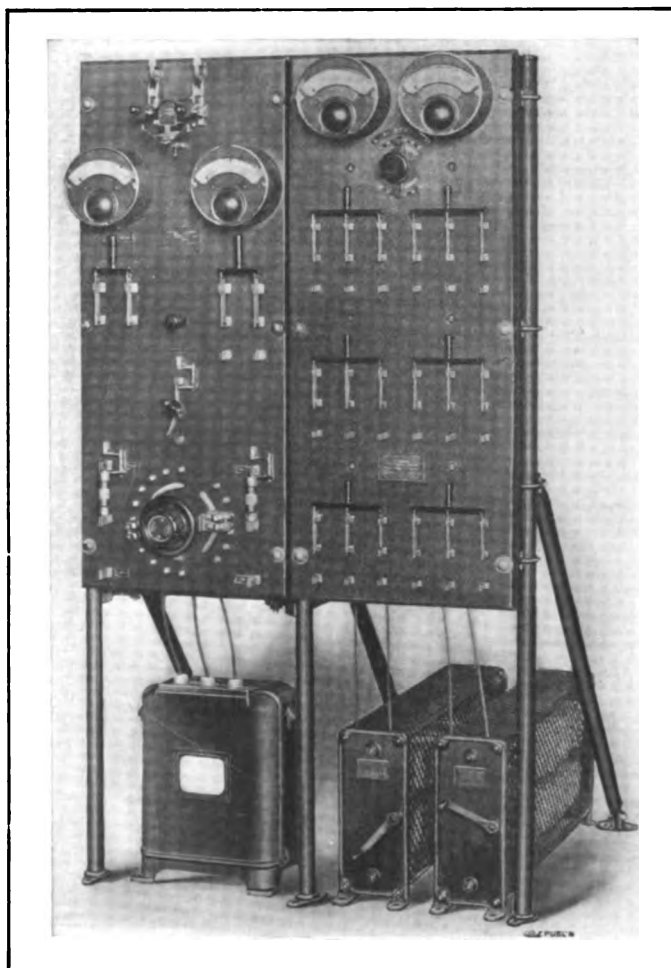
There is a variance in the current that is rectified, but the energy is sent out with even pulsations in one direction. There is, of course, greater regularity or rather more even pulsations with three-phase rectification. For vehicle battery charging the single-phase rectifier appears to have afforded entire satisfaction.

In the construction of the rectifier the tube may be regarded as the only part of the machine that will materially deteriorate with use, and these can be replaced from time to time as occasion may require. Aside from this a rectifier will endure constant service for a long period of time with practically no attention other than such cleaning as will prevent accumulation of dust.

For the purpose of clearly illustrating the principles of operation, the accompanying diagram of the connections of a rectifier tube is produced, with a key that will designate all of them sufficiently. Later on will be shown all of the connections of a single-phase rectifier, and the key will aid materially in explaining them.

While the design of the rectifier is not necessarily a subject for consideration, the function of each part of the machine is essential for a thorough understanding of its operation. The rectifier tube has been explained

in detail and the general principles of the movement of the current in the process of rectification. As has been stated, the current from the negative electrode is carried as direct current through the battery or other load and back to the main reactance, where it is received through the centre or neutral lead, this current charging the halves or sides of the main reactance alternately. This current is discharged through the terminals and is carried through the alternating circuit



Public Garage Type of Mercury Arc Rectifier Battery Charging Equipment Built by the General Electric Company.

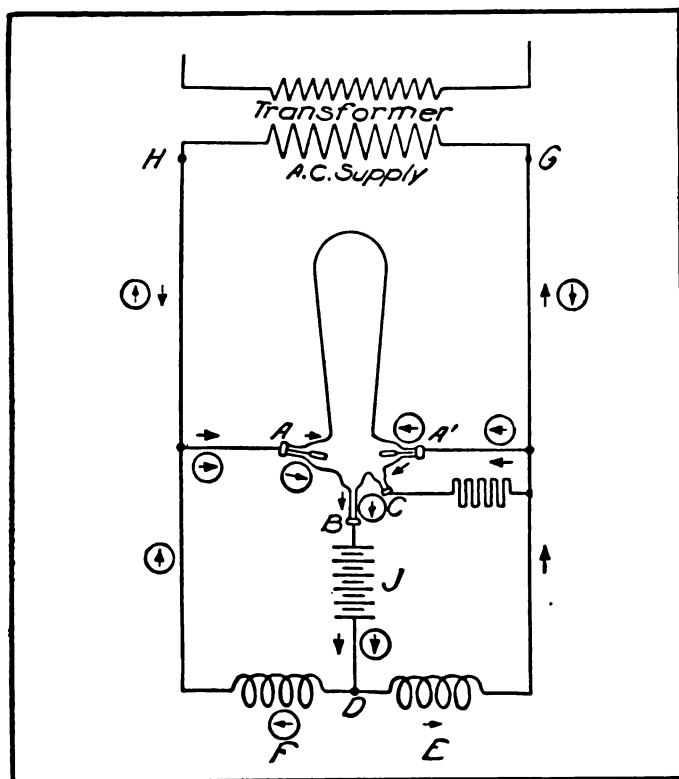
to the positive terminals or anodes of the rectifier tube.

Considering the auto-transformer circuit from an elementary viewpoint. As will be noted from the accompanying sketch this circuit, for a single-phase rectifier, has but one coil, a certain portion of which is used for both high-tension and low-tension windings. The auto-transformer coil is composed of a definite

number of turns of wire of a specified size and conductivity. The number of turns of wire in this coil is the same as though it were used exclusively for the high-tension winding and a separate additional coil were used for low-tension windings.

The voltage per turn is uniform throughout the coil, so that it is practical to place taps or outlets at different points along the coil and obtain whatever ratio of the entire coil voltage is represented by the number of turns of the winding between the taps. The taps may be located with a uniform number of turns between them, or these turns between the taps may be so varied as to obtain any desired voltage when the connections are made in series.

This result is illustrated in the accompanying elementary sketch of a single-phase rectifier auto-transformer circuit, which for convenience had been made



Elementary Diagram of Rectifier Connections—A and A', Positive Electrodes; B, Negative or Mercury Electrode; C, Positive Mercury Electrode for Starting; D, Neutral Lead of the Reactance; E, Right Side of Reactance; F, Left Side of Reactance; G, Negative Terminal of Auto-Transformer; H, Positive Terminal of Auto-Transformer; J, Battery—Arrows Indicate the Movement of the Current at the Instant Assumed; Arrows in Circles Indicate the Movement of the Current at the Succeeding Cycle.

to represent 100 volts between the terminals of main connections of the coil. The coil has been divided into four equal sections, having three taps between the terminals, each section representing 25 volts. Obviously any number of taps could be used in the coil. Noting the sketch, one will see that there are two connections from the alternating current main to the auto-transformer coil, and the taps are placed between these two connections. With this 100 volts is the maximum, but any part of this voltage may be obtained, or any combination made, by locating the taps. In the sketch 25, 50, 75 or 100 volts may be obtained, the first three voltages by connection through one,

two or three sections of the coil, and the full voltage by the connection of the coil terminals.

The capacity of the auto-transformer can be determined with absolute exactness, first by design and second by construction, and the coil made so as to meet any requirement. The voltage through the auto-transformer can be any combination from minimum to maximum, and the number of taps required depends upon the character of regulation demanded by the service in which the rectifier is to be used. With some rectifiers the number of taps may be as few as 10, and with others as many as 17, the greater number affording what is known as "finer" regulation.

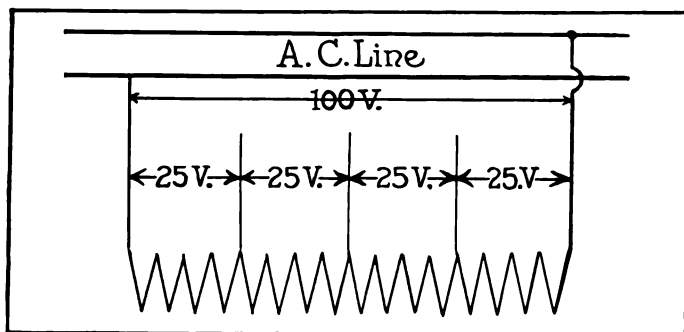
The auto-transformer or regulating reactance, or regulating compensator, according to which term is regarded by the manufacturer as best describing it, is in practise a coil of considerable proportions that is mounted on the back of the panel of the rectifier, and the taps from this are carried to and connected with the contacts of a dial switch. The dial switch is usually divided with two series of contact points and two lever arms that serve as switches. Because of the form of the switch the contacts are arranged in a circle, each series being connected with one side of the transformer coil. The series at one side is known as the "rough" regulation, the variations of the voltage being wider than when the regulation is by the "fine", or more numerous regulating series of contacts at the other side of the dial.

When the current is supplied it is sent through the regulating reactance, being received at the supply voltage. By this regulation the voltage is reduced to whatever figure is desired and it is then rectified and is supplied as direct current. The voltmeter and the ammeter indicate the voltage and the amperage, and the dial switch will establish any standard that is desired between minimum and maximum and, of course, within the limitation of the steps or graduations of the regulating reactance.

At this point the subject can be illustrated by showing a diagram of the connections of the latest design of the General Electric single-phase mercury arc rectifier, which also shows the location of the alternating current line reactance.

Assuming the rectifier tube to be centre of the back of the rectifier panel: A, B, C, D and E are the different graduations of the starting load resistance, this being four resistance tubes arranged as a unit with the taps brought out for the connections. F is a single-pole, double-throw, removable blade switch at either side of the panel, that is mounted on the front of the panel, and H and H1 and L and L1 are the connections with the clips for the contact of the removable blade switch F. The removable switch blades are placed in L and L1 to obtain the minimum, and in H and H1 to obtain the maximum range of voltage that may be obtained from the rectifier.

I is the alternating current series resistance. G and K are the connections from the left and right halves of the main reactance, from which the current



Elementary Diagram Illustrating the Manner of Winding and Tapping an Auto-Transformer.

is supplied to the positive electrodes of the rectifier tube. J is the neutral lead from the main reactance. M is the starting magnet that automatically agitates the rectifier tube. N and O are the connections with the starting anode resistance. SA is the starting anode, X is the connection with the starting switch, and Y is the connection for the starting load resistance, which is coupled with whatever tap of the starting load resistance that may be required.

On the front of the panel is a double-pole circuit breaker, voltmeter, ammeter, alternating current line switch, two removable blade switches, a device (a hand wheel) for shaking or agitating the tube for starting the rectifier, a starting switch, a starting anode switch, a dial switch, and the two rough and fine regulating arms or switch levers of the dial switch. The reactance is usually separate from the panel, but is located generally beneath it, giving greater convenience.

On the back of the panel is the rectifier tube, the tube holder, the starting anode resistance, the starting load resistance, the alternating current series reactance and the regulating compensator. The panel is usually slate and is mounted on pipe standards or supports.

With the General Electric design of a single-phase mercury arc rectifier the main reactance is placed beneath the panel and the coil has three leads that are brought through the top of the casing. Two of these are from the ends of the coil and these are connected with the anodes of the rectifier tube, and the neutral or centre lead is from the series connection of the two coils that constitute the reactance, and this is connected across the secondary of the regulating compensator. This centre lead is the negative pole of the direct current circuit, the mercury electrode of the rectifier tube being the positive pole.

The regulating compensator consists of a coil wound upon one leg of a rectangular laminated iron core, and from this coil 18 taps are brought out, of which 17 are connected to the contact studs of the dial switch, and one is connected with the upper stud of the single-pole double-throw removable blade switch that is indicated as F on the diagram.

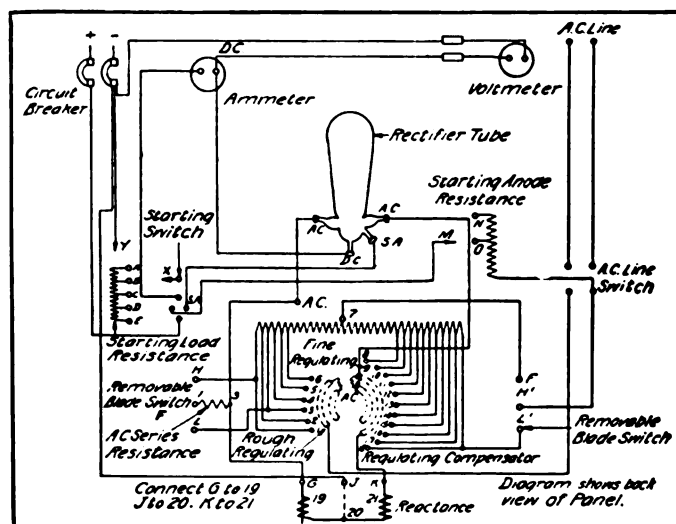
Besides the starting load resistance on the back of the panel, there is the starting anode resistance, which consists of one resistance tube with a tap brought out in the centre, and the alternating current series resist-

ance which is connected with the secondary circuit of the regulating compensator.

The double-pole circuit breaker is of the overload C. G. type, and it is set so that it will open at a current value that does not exceed the rated ampere capacity of the rectifier tube. The circuit breaker may be set to open the direct current circuit at any load up to the capacity of the tube that is desired for the service in which the rectifier is used, but one may accept that the best point for setting the breaker to open is that which corresponds to the overload rating of the apparatus to be operated from the rectifier, provided that this rating does not exceed the rated ampere capacity of the tube. One must not assume that the circuit breaker is a protection against the overcharging of a battery by too long continuing a charge, but it is a protection when rightly set against the battery or other apparatus taking excessive current from the rectifier.

The starting switch is a simple-pole double-throw type that is really a special spring switch, which normally stands in the lower or load position. At starting it is held in the upper position, and when it is released it is automatically thrown into the lower or load position.

The auxiliary switch is a small switch connected with the starting anode circuit, and it is so placed on the panel that when the starting switch is in the load, or lower, position the starting anode circuit is open, and when the starting switch is moved to the starting, or upper, position the auxiliary switch closes the starting anode circuit. The double-pole single-throw switch is connected between the alternating current supply and the regulating compensator, and is known as the alternating current line switch. The dial switch is actually two switches, one of which is operated on six and the other on 11 contacts, that with the six con-



Connections of a Single-Phase Mercury Arc Rectifier: A, B, C, D and E, Starting Load Resistance Terminals; F, Single-Pole Double-Throw Removable Blade Switches; G and K, Main Reactance Leads; H and H1 and L and L1, Clips for Removable Blade Switches F; I, Alternating Current Series Resistance; M, Terminal for Connecting the Starting Circuit Through the Starting Anode Resistance; N and O, Terminals of the Starting Anode Resistance; SA, the Starting Anode Terminal; X, the Connection with the Starting Switch; Y, Terminal for Connection of the Starting Load Resistance in the Circuit.

tacts being used for rough regulation, and that operating on 11 contacts for fine regulation.

The single-pole double-throw removable blade switch is connected with the regulating compensator, so that by placing the blades in the lower clips the minimum range of voltage, and in the higher clips the maximum range of voltage, may be obtained.

The rectifier tube is mounted in a holder or cradle into which the smaller end is inserted, the upper or larger end being clasped by two springs that encircle the condensing chamber. This cradle is slightly movable, so that the tube may be agitated for starting. The connections are made by placing the two upper clips coming from the studs on the panel marked AC on the anodes or arms of the rectifier tube, the clip from the DC stud on the panel to the mercury electrode or cathode, and the clip from the SA stud on the panel to the starting anode or small mercury electrode. Referring to the diagram of connections one will note that the lead 19 is connected to the terminal G, lead 20

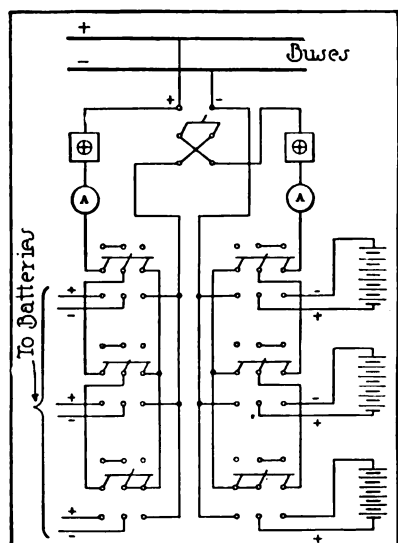


Diagram Showing the Connections of the Distribution Circuits of a General Electric Mercury Arc Rectifier Garage Panel.

is connected to the terminal J, and lead 21 is connected to the terminal K, G and K being the leads from the ends of the main reactance, and J being the neutral lead from the centre of the main reactance. The alternating current is connected to the studs at the top of the panel marked AC, and the load is connected to the upper studs of the circuit breaker marked respectively plus

and minus. When batteries are used as a load one must be certain to connect the positive lead to the positive terminal on the panel. One may note the connections as stated and make comparison with those given in the diagram, these being for the operation, but not for the adjustment, which will depend on the voltage of the alternating current circuit, while the direct current voltage to be supplied will depend upon the connection with the starting load resistance, the position of the removable blade switches and the position of the rough regulation arm on the dial switch. When the alternating current line voltage is 110 the terminal M at the right of the starting anode should be connected with the terminal O of the starting anode resistance, which only uses a part of the resistance, but when the voltage is 220 on a 60-cycle circuit, the connection of M should be with N on the starting anode resistance, this making use of the entire resistance.

Referring to the diagram, the tabulation of con-

nections of the starting load resistance, the removable blade switch and positions on the rough regulation dial will show how the direct current voltage may be adjusted for five different ranges of voltage on the 110-volt circuit, and six different ranges of voltage on the 220-volt circuit.

In the installation of the rectifier the main reactance is placed on a piece of slate or marble, which is not combustible and will not absorb fluid, this being a necessary precaution unless the floor is of tile or concrete. This base piece should be of sufficient size to afford the desired protection.

The rectifier tube is exhausted of air and so long as this condition exists the mercury will flow freely when the tube is held horizontally. A tube can be tested to ascertain the condition of the vacuum by holding it in a horizontal position, with the arms or trunnions in the plane of the horizon, so that the mercury will not flow into them. If the mercury flows readily when one end of the condensing chamber is lowered and makes a clear metallic click, the vacuum may be considered good, but if the mercury moves sluggishly and the sound is dull, then the vacuum may be partly or wholly reduced. When the vacuum is poor the tube will give but brief service or there is a possibility that it may not be useful, but this can only be determined by installation of the tube in the rectifier cradle and testing it.

After a rectifier has been installed and connected the circuit breaker is set to open so that the rated capacity of the tube will not be exceeded, and with this precaution the machine is in readiness for operation. Operating a rectifier is simple when a formula is followed. For starting the starting load and the starting anode resistance are first connected, then the removable switch blades are placed in either the upper or lower clips, according to the voltage range desired, and the rough regulating dial switch is set. These are to be placed according to the following tabulation:

When operated on a 110-volt 60-cycle circuit, with the terminal M connected to the terminal O of the starting anode resistance:

Direct Current Voltage	Position of Removable Blade Switch	Position on Rough Regulating Dial	Connections of Starting Load Resistance
10 38	H-HI	1 or 2	Y to B X to C
35 55	H-HI	3	Y to C X to D
50 70	H-HI	4	Y to B X to D
60 85	H-HI	5	Y to A X to D
70 100	H-HI	6	Y to D X to E

When operated on a 220-volt 60-cycle circuit, with the terminal M connected to the terminal N of the starting anode resistance:

Direct Current Voltage	Position of Removable Blade Switch	Position on Rough Regulating Dial	Connections of Starting Load Resistance
20 40	L-LI	1 or 2	Y to C X to D
25 50	L-LI	3 or 4	Y to C X to D
35 75	L-LI	5 or 6	Y to B X to D
60 90	H-HI	1	Y to D X to E
85 120	H-HI	2	Y to C X to E
110 175	H-HI	3 or 4	Y to A X to E

Next the alternating current switch and the circuit breaker are closed, and the starting switch is

held in the upper position while the tube is rocked by the hand wheel connected with the tube holder.

The movement of the tube will cause the mercury of the two electrodes in the base to meet and form a bridge between them, and as this bridge is broken a slight flash will be caused in the tube and rectification will be begun. Normally one rocking of the tube and a single flash will be sufficient to start it operating, but should the weather be cold, or the tube be used at less than the rated voltage, more than one agitation may be necessary. When the hand is removed from the spring switch it will automatically throw into the lower position and transfer the direct current from the starting resistance to the load, and it will also open the starting anode circuit.

If the load should be a battery and the voltage of the battery is higher than that of the rectifier, the tube will cease to operate when the spring switch is moved to the load position. This condition indicates that the voltage of the rectifier must be raised, which is done by the fine regulating dial switch, which is moved counter clockwise, and the rectifier is again started as before. But should the rectifier again stop the voltage is increased for the second time by the rough regulating dial switch, which is also moved counter clockwise. Several changes may be necessary to obtain the voltage and current that is required to charge the battery. When the position of the rough regulating dial switch is established the other changes needed for regulation can be made with the fine regulating switch.

The rectifier efficiency is maintained at a comparatively high point during its operation. The rectifier bulb absorbs a certain constant voltage, approximately 15 volts, practically independent of the volume of current flowing. This loss is represented by heat and light. The efficiency varies with the voltage of the load, and values are fairly represented when statement is made that the rectifier that will have about 70 per cent. efficiency when charging 20 cells will have about 85 per cent. when charging 44 cells.

In garages where more than one machine is to be charged at a time a panel is generally utilized. Conditions will govern the exact method to be used, but the purpose is to so arrange the equipment that a number of vehicle batteries may be charged in series and others in multiple. When the conditions are known the better method can be determined by calculation, and principles can be followed that have been adopted with entire success in either small or large garages.

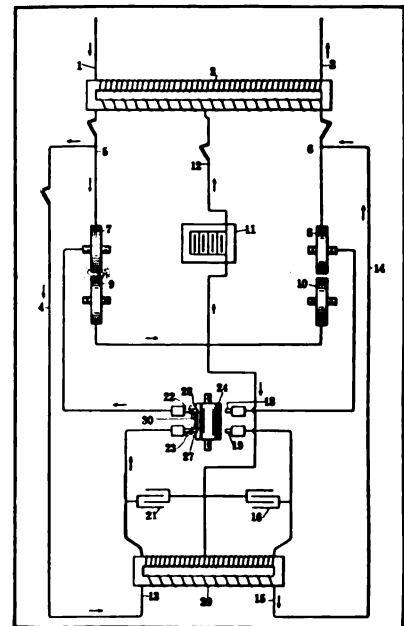
Considering the garage panel that may be used with a rectifier, a plan that shows the connections of the distribution circuits for a General Electric mercury arc rectifier is of interest. By reference to this one will note that connections can be made with six batteries in series, two groups of three or less in series, and any single battery in series with resistance. The purpose of the arrangement is to simplify the making of connections, minimize the labor and economize energy.

Considering the plan and assuming that the volt-

age across the charging bus bar is 220 and the requirements for three batteries are respectively 40, 60 and 100 volts, by connecting the batteries in series as is illustrated in the plan but 20 volts are absorbed by the rheostat. The plan is intensely practical and where batteries of differing sizes are to be charged and rheostats are used to reduce the voltage, it is flexible and economical of energy.

The alternating current may be rectified by the Murphy mechanical rectifier, which is not so generally used, but which is a thoroughly practical and useful outfit. The principle of the Murphy rectifier is diagrammatically shown. Referring to this plan one may note that the alternating current is received by the lines one and three and supplied to the line transformer three. A synchronous motor, operating in step with the line alterations, is represented at 24. On the shaft of the motor is an insulated collar on which are the metallic points 27 and 28, which are connected by a conductor bar that is designated as 30. In holders that

can be revolved around the axis of the insulated cylinder are placed metallic points that are shown as 18, 19, 22 and 23. The electrode discs 7, 8, 9 and 10 are revolved by the motor. The primary wires of a small, specially constructed transformer are indicated by 13 and 15, and the secondary wires of the transformer are connected with condensers 16 and 21. A storage battery that is to be charged with direct current is represented by 11.



The Principles of the Murphy Mechanical Rectifier Shown by a Diagram Illustrating Them Applied to a Two-Pole Synchronous Motor.

In practical operation the synchronous motor is brought to synchronism by cranking, and then a switch that controls the primary of the small transformer is closed. The transformation of the alternating current to direct is by the following process: At the instant the metallic points 27 and 28 on the insulated cylinder are opposite to points 22 and 23, the condenser 21 discharges through the air gap between the points, and also through the air gap between the electrode discs 7 and 9, permitting the line current to flow through the conductor 5, the electrode discs 7 and 9 to the battery 11 and return to the line by the conductor 12. During the next half cycle of the current the metallic points 27 and 28 on the cylinder have been brought opposite the points 18 and 19. Then condenser 16 is discharged, the current flowing through the condenser, the electrode discs 8 and 10

to the battery 11, and returning to the line by conductor 12. The arrows indicate the direction of the current flow.

The process is repeated with each cycle of the alternating current, there being a rapidly unidirectional current impressed upon the battery. The metallic points 18, 19, 22 and 23 can, by means of a rocker arm, be moved around the axis of the cylinder, carrying the points 27 and 28, so that the condenser discharge can be made to take place at any point of the wave of impressed voltage. By the variation of the metallic points the voltage of the direct current can be regulated through a very wide range, from any fraction of a volt to the full line voltage. This regulation is so close that one battery cell, or any number within the capacity of the line voltage, may be charged, and the rectification of current may be from a milliampere to any amount that may be utilized.

The Murphy rectifier is constructed with a four-pole motor, which is provided for by adding to the insulated collar two more metallic points, suitably spaced, and adjusted with relation to the metallic points 18, 19, 22 and 23, which are not shown in the diagram, which represents a two-pole motor for simplification of the drawing and convenience of description.

These rectifiers are fitted with an automatic device that will operate and will stop the charging current when the battery has reached a voltage for which it is set, this opening the sparking current circuit, and it is further protected by a device that will open the sparking current circuit in the event of the current becoming abnormal. One will note that both these devices do not break the charging current.

(To Be Continued.)

NO STANDARD OIL MONOPOLY.

The Standard Oil Company has been vindicated in New Jersey of the charge brought by the Crew-Levick Company, Jersey City, N. J., an independent. This concern charged the Standard company of violating the "Seven Sisters" law, which was enacted in the State of New Jersey while President Wilson was governor. The charge was that the Standard company was charging a low rate in the competitive districts and a high rate in sections where it had no competition.

The court took into consideration the competition of the Gulf Refining Company, which has been engaged in a price war with the Standard company throughout the entire state.

An ordinance has been introduced in the Indianapolis, Ind., city council, to protect taxicab owners against persons who do not pay their fares.

The Garage Owners' Association of Illinois is to issue a call for the organization of a National Garage Owners' Association.

SUPERIOR HEATER.

Those who store their motor vehicles in unheated buildings will be interested in the Superior heater, designed especially by the Superior Manufacturing Company, Pittsburg, Penn., for maintaining an even temperature during cold weather at a nominal cost. In addition to providing comfort when washing or working on the car, the Superior prevents damage by freezing as well as makes for easy starting.

One of the desirable qualities of the Superior is that it may be lighted at the beginning of the cold season and kept lighted throughout the winter. This is accomplished by means of a pilot light, and a valve handle makes it possible to obtain any temperature desired at any time.

The maker lays great emphasis on the safety quali-



The Superior Heater Which Keeps the Garage at an Even Temperature at All Times.

ties of the heater, stating that any explosive fuel vapors cannot be ignited by the heater, which is as practical as a miner's lamp.

The Superior is a small furnace, consisting of a combustion chamber and a tubular radiator inside a heavy galvanized casing, the outside dimensions being: Length, 40 inches; height, 33 inches, and width, 12 inches. Its compactness is shown in the accompanying illustration. That no gases or air from the inside of the building can possibly enter the heater at any time, is the claim of the manufacturer. A safety locking door is provided and, after the heater is once lighted, it is not necessary to open it for any ordinary reason. An automatic arrangement makes it impossible to overheat and consequently one can be absent for a week or more at a time, and be assured that the building will be amply warm to meet all requirements.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXVI---The Bosch NU4 Type Magneto, in Which the Distributor and Armature Gear Are Replaced by a Slip Ring Mounted on the Driving End of the Armature Shaft, the Current Being Distributed by Carbon Brushes.

By C. P. Shattuck.

IN PREVIOUS installments it was shown that with but one exception, it is general practise to locate the distributor above the armature shaft and to drive it at half armature speed, utilizing gears, these being so proportioned as to obtain the required reduction.

Novel Distributor.

A magneto that differs radically from conventional practise is the Bosch type NU4, shown at Fig. 162, a true high-tension instrument designed for four-cylinder, four-cycle motors of moderate cylinder dimensions, although its output is stated to be sufficient to meet general requirements.

The most striking feature of the new magneto is the elimination of the usual distributor and armature gear and, as may be noted by the illustrations at Figs. 162 and 164, these components have been replaced by a novel and ingenious construction for distributing the high-tension current to the spark plugs.

It will also be seen by reference to Fig. 165 that the intensified current is collected from a slip ring arrangement mounted on the driving end of the armature shaft, and that the entire construction consequently rotates at crankshaft speed. It is this feature that is of particular interest.

Double Slip Ring.

The slip ring follows Bosch practise in that it is a one-piece construction, but it is provided with two grooves in the hard rubber insulation. Imbedded in the base of each groove of the double slip ring is a metal segment flush with the surface of the material and, as may be noted by reference to Fig. 165, there are two segments placed diametrically opposite, or 180 degrees apart. These metal segments are insulated from each other, as well as from the metal of the frame, armature core, etc.

How Current Is Collected.

The high-tension current is collected by carbon brushes, four in number, and their arrangement is plainly indicated at Fig. 165. Connecting with each of these brushes by a novel method is a cable which leads to a spark plug, the wires being attached to the plugs according to the firing order of the motor; that is, the timing is such that, when one brush is making a contact to produce a spark in a cylinder ready to fire, the other brush, resting against a segment, leads the high-tension current to a cylinder that is exhausting. From this it will be seen that two sparks occur each half revolution of the armature shaft and that but one is utilized for igniting the mixture in the cylinder. This

surplus spark is, therefore, exactly 360 degrees behind the ignition spark.

Effect of Surplus Spark.

Naturally the question arises as to what effect this extra spark will have upon the operation of the motor. It will have none, because it occurs when the piston is expelling the burned products of combustion. This utilization of a surplus spark is not new, as it is employed with two-cylinder, four-cycle motors, and has been used on two-cylinder automobiles employing batteries, a timer and an induction coil for ignition.

In place of the usual distributor plate with its terminals, two brush holders are utilized, these fitting di-

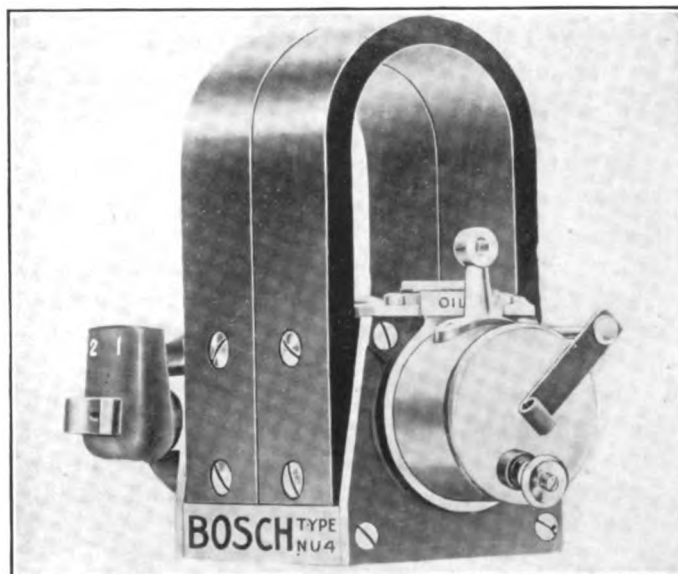


Fig. 162—The Bosch Type NU4 Magneto, a True High-Tension Instrument in Which the Conventional Distributor Is Replaced by a Double Slip Ring Driven at Crankshaft Speed.

rectly into openings in each side of the driving shaft end plate. These holders, as may be noted by the illustration at Fig. 164 and the wiring diagram at Fig. 167, are marked in white figures, 1 and 2, indicating the pairs of brushes receiving simultaneous contact. With this arrangement the proper fitting of the cables to the holders and spark plugs is greatly simplified. The brushes marked 1 constitute one pair and those marked 2 the other set.

Firing Order.

Four-cylinder motors are built to fire either 1-2-4-3 or 1-3-4-2 and, with the former, the third cylinder is exhausting when the first is firing. With the firing order 1-3-4-2, the second cylinder is exhausting when the first is firing. An accompanying table shows the

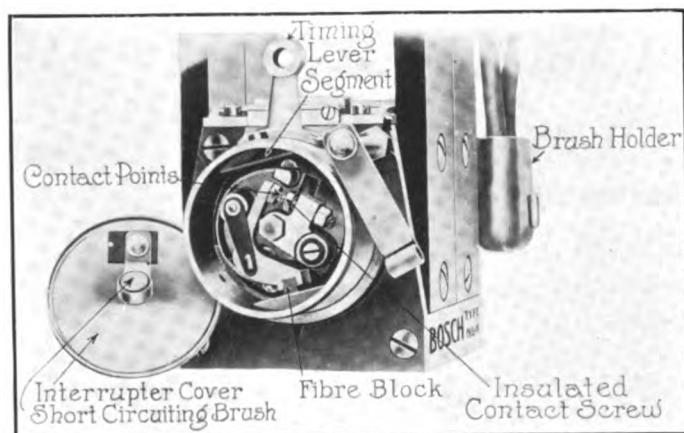


Fig. 163—The Circuit Breaker Mechanism of the Type NU4 is the Same as in Standard Bosch Types.

sequence of strokes with both firing orders and will be of value in studying the timing and fittings of the cables to obtain the surplus spark in the cylinder exhausting.

The type NU4 magneto follows Bosch practise in that two sparks are obtained each revolution of the armature shaft which, as previously pointed out, is driven at crankshaft speed. As is the case with all

FIRING ORDER, 1-2-4-3.			
Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
1—Firing	Compression	Exhaust	Suction
2—Exhaust	Firing	Suction	Compression
3—Suction	Exhaust	Compression	Firing
4—Compression	Suction	Firing	Exhaust
FIRING ORDER, 1-3-4-2.			
Cylinder 1	Cylinder 2	Cylinder 3	Cylinder 4
1—Firing	Exhaust	Compression	Suction
2—Exhaust	Suction	Firing	Compression
3—Suction	Compression	Exhaust	Firing
4—Compression	Firing	Suction	Exhaust

true high-tension instruments, the armature is provided with two windings, a primary (coarse) and a secondary (fine).

Following conventional design, the primary winding of the NU4 is connected at one end to the armature core, while the other is attached to the insulated contact block carrying the long or adjustable platinum contact screw, as indicated at Fig. 163.

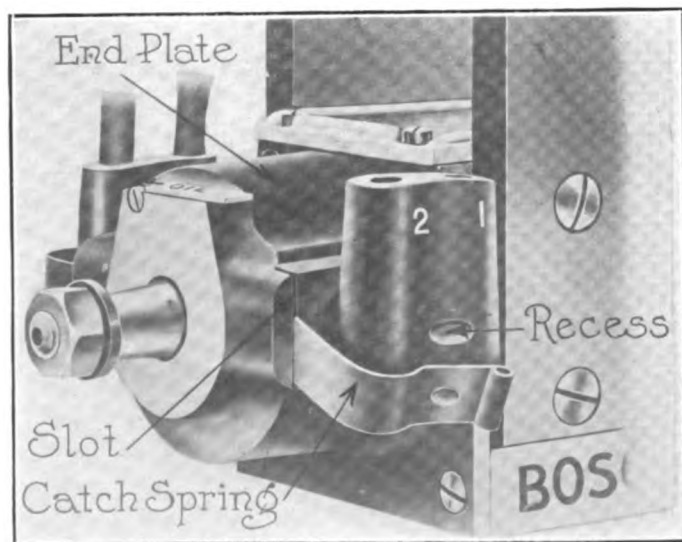


Fig. 164—Showing the Marked Brush Holders in Place and the Compactness of the Design.

The interrupter lever carrying the fixed platinum contact screw is mounted on the interrupter disc, which in turn is connected with the armature core. The primary circuit is completed whenever the two contact points are together, and broken when they separate. Upon the points breaking, a high-tension current is induced in the secondary winding, and the spark occurs upon the interruption of the primary circuit. The breaker mechanism, which is standard, revolves with the armature shaft, and the break of the points is obtained by the use of two metal segments integral with the circuit breaker housing. It will be seen that the construction is the same as has been used for years by the makers of the Bosch magnetos.

Windings Separated.

The collection and distribution of the high-tension current, however, differs materially. In the standard magnetos, such as the DU4, ZR4, etc., previously described and illustrated, the secondary winding is prac-

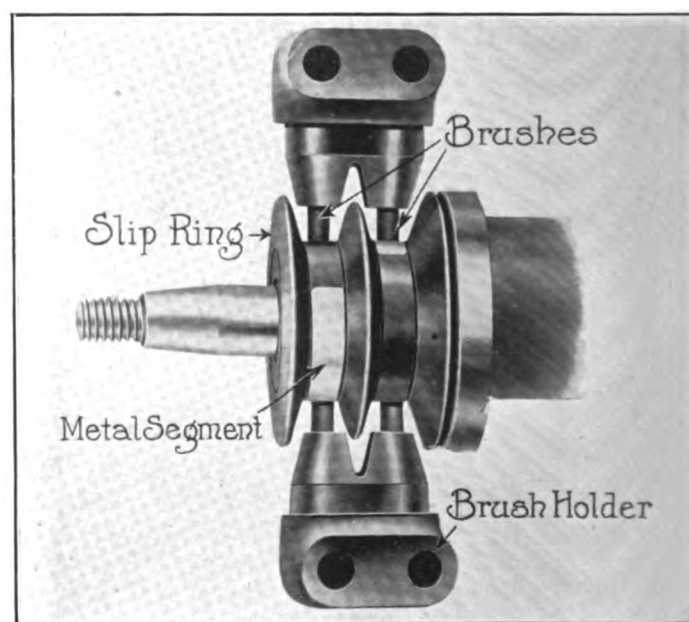


Fig. 165—The Double Slip or Collector Ring Having Metal Segments Placed 180 Degrees Apart.

tically a continuation of the primary, its inner end connecting with the latter, and the other end leading to an insulated slip ring or collector ring mounted on the armature shaft near the driving end.

The current is collected from this slip ring by a brush and led to the distributor brush, which makes contact with the segments in the distributor plate and in accordance with the firing order of the motor.

In the type NU4 there is no connection whatsoever between the primary and secondary winding of the armature. These windings are insulated from each other, and the two ends of the secondary circuit are connected to the two metal segments of the slip ring, rotating with the armature shaft. The collection of the high-tension current and its distribution has been explained.

Timing Magneto.

The timing of the NU4 magneto is simple. The piston of the No. 1 cylinder is placed upon top dead centre or completion of the compression stroke, al-

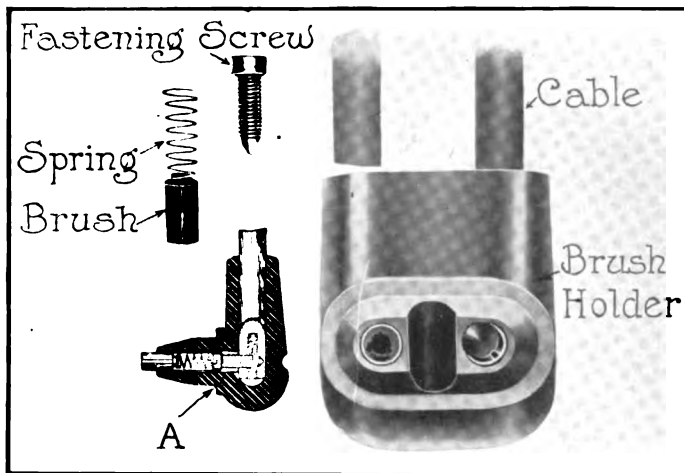


Fig. 166—The Double Brush Holder with Brush and Fastening Screw Displaced—A Shows Method of Retaining Strands of Wire and Efficient Connection.

though with some engines the manufacturers may set the instrument so that the break of the contact point will be obtained earlier or later.

With the piston properly located, the metal segments of the slip ring are placed in contact with the brush marked 1 in each of the brush holders. The work is completed by connecting one of the brushes, marked 1, with the first cylinder of the motor and the other with the fourth cylinder. The remaining brushes, marked 2, are connected with cylinders two and three.

Brushes Accessible.

The distributor and collector are compactly arranged, as may be noted by reference to Fig. 164. The brush holders fit directly into openings in each side of the driving shaft end plate and are held in place by an L shaped spring. One end of this spring pivots in a slot cut vertically in the side of the end plate, and the other has a small boss which, when the spring is in its normal position, rests in a recess in the brush holder. The tension of the spring is sufficient to retain the holder securely, and the latter may be displaced easily by pushing the spring downward, when the holder can be slipped out of the end plate.

A noteworthy feature of the brush holders is the means utilized to retain the cables in place. The arrangement is shown at Fig. 166, which depicts a cable in place, also one removed. The insulation is removed from the cable and the wire section inserted through the opening of the holder until it bottoms as shown at A. A small screw is then inserted and set up tight, which splits the strands, at the same time locking them. This insures a perfect connection; one that will not be affected by the vibration of the motor, oils or the weather. The carbon brush is a simple construction and proper contact with the metal segment is obtained by the use of a light spring.

Compact Design.

The NU4 magneto is particularly adapted to a power plant where the space is limited, and the elimination of the usual gears and distributor makes for a simple construction, one easily cared for and cleaned.

Not only is the construction water and dust proof, but it is impossible to reassemble the components incorrectly.

The dimensions of the magneto give some idea of its compactness: It is slightly over four inches wide, about six high, and, from the end of the ground terminal nut to the threaded extension of the armature shaft, is but nine inches.

Wiring Plan.

The grounding of the primary current, as when stopping the motor, is by the usual method, the primary current being collected by a brush in the cover of the circuit breaker housing, thence to a terminal and then to some metal part of the chassis. This diverts the primary current, thereby preventing its being intensified.

(To Be Continued.)

Ed. Note—The next installment will deal with the Swiss magneto, a true high-tension instrument, which differs from conventional design in several respects.

RUBBER TIRES FOR STREET CARS.

The equipping of street cars with rubber tires was suggested at the recent session of the Tramways Association of Great Britain. It was pointed out that a properly designed tire for street cars would exceed the life of tires on motor 'buses and motor wagons, which were stated to give 20,000 miles and over.

Statement was also made that wear on rails would be reduced and that the cost of maintenance would be largely decreased. This innovation would possibly solve the corrugation problem.

Another strong argument made in favor of rubber tires for tramway cars was the doing away with all unnecessary noise and all vibration. It was estimated that a speed of 20 miles an hour could be obtained with rubber tire equipped cars.

SEEK TO HELP WALPOLE COMPANY.

A special stockholders meeting of the Walpole Tire & Rubber Company, Boston, Mass., has been called for Sept. 29, at which time steps will be taken to elect a new board of directors, and perfect reorganization plans. The company will be taken out of the hands of the receivers, refinanced and reorganized.

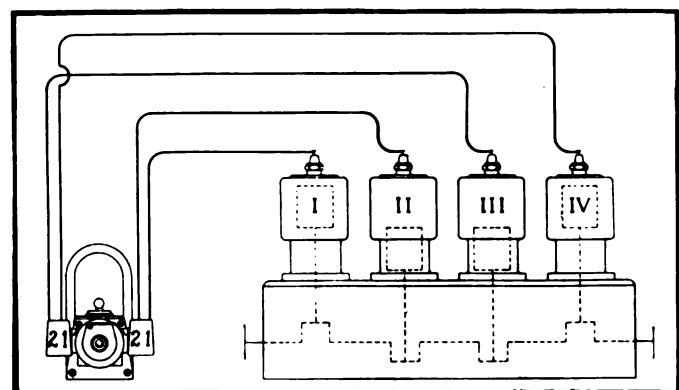
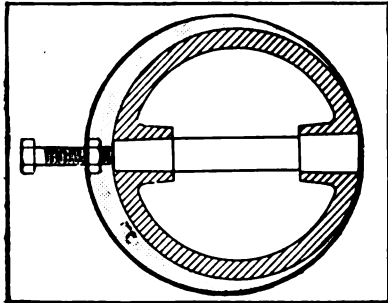


Fig. 167—Wiring Diagram of Bosch Type NU4 Magneto.

HINTS FOR PROPER MAINTENANCE.

WITH some types of wristpins considerable care must be exercised in their removal. The tapered design is especially difficult to displace, and



Easily Constructed Tool for Removing Wristpins.

the use of a hammer and punch is not recommended, as the piston is likely to be damaged. The better method is to force the wristpin out by means of the tool shown in the accompanying illustration and, as may be noted, it comprises a strip of metal slightly larger in diameter than the piston. Holes are drilled through the overlapping ends, a threaded bolt is passed through these openings, and a nut screwed upon the inner side of the bolt. The strip is then placed upon the piston and tightening the nut subjects the wristpin to end pressure, forcing it out through a hole provided in the opposite end of the metal strip. The tool can be utilized for replacing the wristpin if desired.

TESTING CURRENT LEAKAGE.

The tendency of the high-tension or intensified primary current in the ignition system is to take the path offering the least resistance. The flow of the current may be compared to a stream of water passing through a pipe, one end of which is supplied with a nozzle. As long as the walls of the pipe are intact, the fluid will be forced out of the nozzle, but any opening presenting less resistance to the passage of the water will result in the fluid leaking out of the hole.

Resistance to the passage of the high-tension or secondary current is set up by the air gap at the spark plug and by the conducting material, although the last named is a negligible factor. When the insulating material of the cable becomes cracked, saturated with oil, or so dry as to lose its efficiency, the electricity will escape to the nearest metal, a condition termed a short circuit or partial ground.

When one cylinder misses intermittently, and the fault is not due to the mixture or operation of the valve mechanism, and the spark plug is functioning properly, tests should be made to locate the cause of the trouble. Generally, the missing occurs when the vehicle is on the road, and it may be caused by the vibration moving a cable in proximity to some metal part.

If the usual tests fail to locate the section of the cable leaking the current, start the motor in the garage with the lights turned off. Generally the leak will be indicated by a blue flame. If the miss is not no-

ticeable, move the suspected cable slightly until near some metal component of the power plant. Usually this will result in the discovery of the weak place in the insulation, which can be repaired by friction tape, although the better method is to fit an entirely new wire.

LEAKAGE OF LUBRICANT.

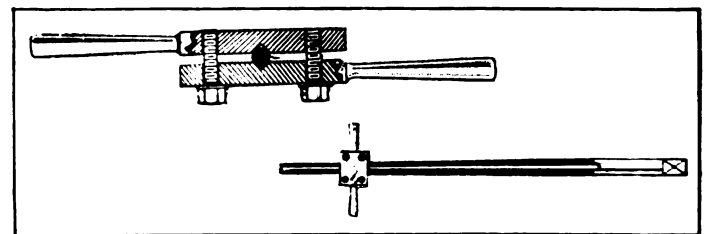
Cylinder oil costs money and the careful driver of a commercial vehicle will note any undue escape of lubricant from the power plant and investigate the cause. Old motors are common offenders, as the push-rods wear, allowing the lubricant to escape, and it is particularly noticeable with engines not provided with a breather for reducing the compression in the crank case. Poor fitting rings are sometimes responsible for the leakage of lubricant as, on the compression stroke, the crank case is more or less filled by pressure.

Another component that may cause leakage is the end main bearing. Some early types of motors are fitted with felt gaskets to prevent loss of oil, and in time these become hard, a condition which tends to wear the shaft. Poorly fitting gaskets are another cause of leakage. When oil drips from the power plant an investigation should be made and the fault corrected. It will not only result in economy of lubricant, but may prevent the burning out of a bearing, especially when the lubrication system is of the old form of splash.

USING SMALL TAPS.

The use of small taps requires considerable care, as they are easily broken, especially if the clamp be too large, for the novice generally utilizes too much strength. This applies particularly to taps $\frac{1}{8}$ and $\frac{3}{16}$ inch in diameter.

The clamp shown in the accompanying illustration is suggested by a repairman, who states that its use will result in a smaller number of taps being broken. The tool is constructed of a piece of mild



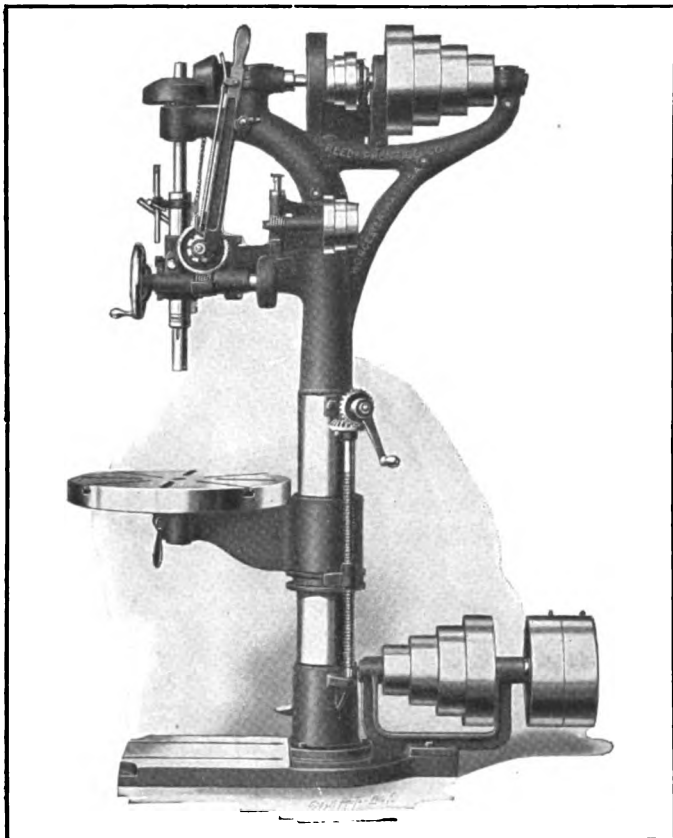
Clamp for Small Taps—The Lower Exaggerated View Illustrating the Method.

steel plate and, being provided with bolts, it may be adjusted to meet requirements. The lower view is exaggerated to illustrate the method.

NEW MACHINERY AND PRACTICAL TOOLS.

THE Reed & Prentice Company, Worcester, Mass., is manufacturing a line of upright drilling machines constructed for a class of trade demanding accuracy and reliability.

One of these, the Prentice, is shown in an accompanying illustration. Eight spindle speeds are available, four open belt speeds and four back speeds, there being a lever which operates a positive clutch for the back gear speeds and a friction clutch for the open belt speeds. Three belt driven power feeds, powerful lever feed, and a worm driven, hand wheel feed are provided. The power feed is transmitted from the belt shaft by a double worm gear drive, and may be engaged or dis-



Reed & Prentice Upright Drilling Machine.

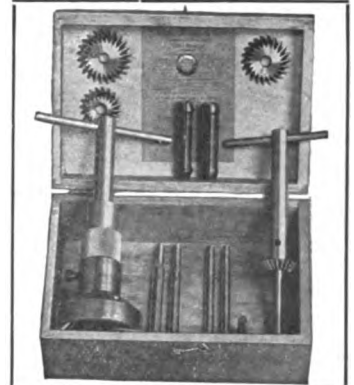
engaged by means of a pull pin which operates a sliding spring key in one of the worm gear shafts.

By means of an adjustable stop rod on the spindle quill, which trips a lever on the drill head, the driving worm may be dropped out of mesh with the worm gear, thereby disengaging the power feed automatically. The feed lever is made especially long to insure a powerful leverage. High carbon crucible steel is used in the spindle, which is sensitively counterbalanced by means of a weight inside the column. The swinging arm table is of very rigid construction, and is in accurate alignment with the spindle. Its supporting arm is raised and lowered by means of a screw. The frame is rigid and all gears are guarded to protect the operator. A tapping attachment is furnished when desired. It consists of three bevel gears

and a double positive clutch, enabling the spindle to be reversed at a speed five times that of the tapping speed. Complete details and prices are given in the catalogue issued by the company.

FOSNACHT VALVE RESEATER.

The Fosnacht valve reseater, one of the oldest tools of its kind on the market, has been improved in several ways. The five standard chucks have been replaced by two universal members, permitting a wide variety of accurate work to be performed, as they will accommodate valve stems from 5/16 to 1/2-inch inclusive. The reamers have also been improved and valves from 1 1/2 to 2 3/8 inches may be seated accurately and quickly.



New FOSNACHT Valve Reseater.

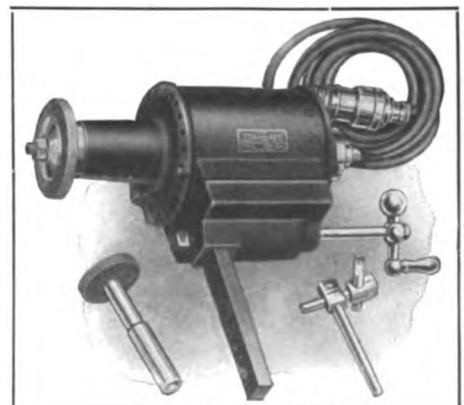
The tools are built to exact standard and are designed to withstand severe service. Their practicality and time and labor saving qualities are indorsed by hundreds of users. Garages, repair shops and service stations will do well to investigate the merits of the Fosnacht, which is made by H. G. Paro, 30 North Michigan boulevard, Chicago.

STANDARD TOOL POST GRINDER.

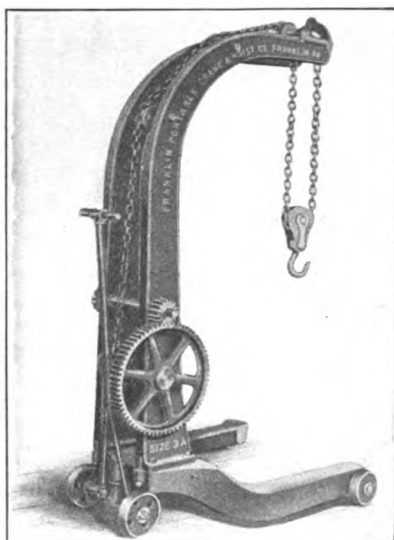
With portable electric tools, much time and labor is saved in the service station and repair shop. The Standard Electric Company, Cincinnati, O., is manufacturing a wide variety of these tools, one of which, a tool post grinder, is shown in an accompanying illustration.

One of the desirable qualities of the Standard is that it is built as light as possible, consistent with the power developed, and is constructed with a view to giving efficient and economical service.

The motor is compound wound, insulated and impregnated throughout by a special process. The armature poles are built of soft steel laminations, and are carefully and uniformly insulated. Imported



Standard Electric Tool Post Grinder.



Franklin Portable Crane.

alternating current of 60 cycles or less. It is wound for 110 or 220 volts, and has a lamp socket connection. The grinder is produced in types 2Tu and 4Tu,

ball bearings are used throughout and each member is mounted in a dust proof chamber. The cooling is by means of a fan mounted on the armature shaft. The fan expels the warm air, which is replaced by cool. The direction of the circulation is from the commutator to the wheel end.

The grinder is made to operate on both direct and

both having a speed of 6000 revolutions a minute. The first-named design is fitted with an emery wheel $3\frac{1}{2}$ inches in diameter with $\frac{3}{8}$ -inch face, while the 4Tu has a four-inch diameter wheel and $\frac{3}{4}$ -inch face. Complete details and prices will be supplied by the manufacturer upon request.

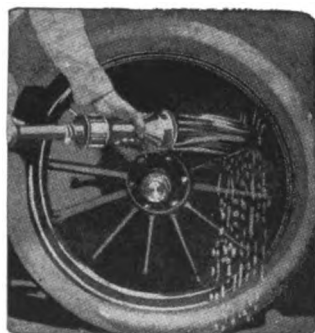
FRANKLIN PORTABLE CRANE.

The Franklin Portable Crane & Hoist Company, Franklin, Penn., manufactures a variety of portable crane hoists, one of which, size 2 A, is shown in an accompanying illustration. This crane has a capacity of two tons and an overhang of two feet, $7\frac{1}{2}$ inches. The height is seven feet, six inches and the height of the hoist six feet, three inches. The dimensions of the bed are: Outside, two feet, $2\frac{1}{2}$ inches; height, 12 inches. The net weight is 800 pounds. The Franklin portable crane hoists are constructed of the best of material, and complete details and prices will be supplied by the maker upon request.

GARAGE EQUIPMENT AND SUPPLIES.

IN THESE days of keen competition, time and labor saving equipment should be given consideration. Any equipment which enables the employees to minimize their work is money saved and custom gained.

A most practical time and labor saving washer, especially adaptable to cleaning highly finished surfaces, is the Wizard, manufactured by the Century Foundry Company, Inc., 1624 North Salina street, Syracuse, N. Y. The equipment includes a nozzle containing a turbine motor, one conical and one straight



Wizard Washer, Having Rotating Brushes.

sided brush and a 12-foot extension for reaching beneath the car.

With the Wizard washer every part of the machine can be cleaned. Rotating brushes, driven and flooded by a stream of water, applied to the surfaces, obviate abrasions and remove all accumulations. Their use eliminates

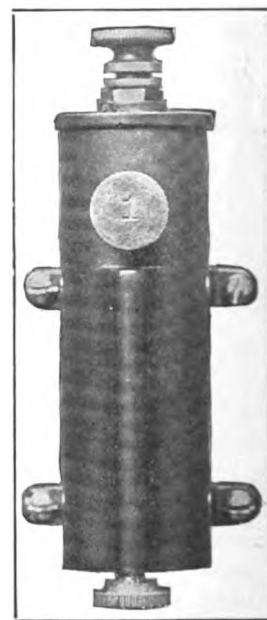
buckets, sponges, soaps, etc. The Wizard is sold under a liberal guarantee. Details and prices will be forwarded upon request.

W. & L. PROTECTOR.

The W. & L. Manufacturing Company, Inc., Buffalo, N. Y., is producing the W. & L. coil and battery protector, shown herewith, which safeguards these members as well as the magneto. It is practically insurance in that in the event of a short circuit the cur-

rent supply is cut off. One of the novel features of the W. & L. device is that no fuses or parts have to be replaced after it has interrupted the circuit, as the protector operates automatically. No matter how frequently it serves its purpose, the protector is always efficient and cannot fail to operate whenever the circuit is heated.

The principle involved is that of heating a resistance coil and utilizing the heat to melt a sealing compound or composition. The last-named material actuates a spring, which in turn breaks contact with a screw member. With the breaking of the circuit the sealing compound hardens, and the protector again becomes serviceable. It is moderately priced and easily installed. Prices and details will be supplied upon request.



The W. & L. Protector.

AVON AIRLESS TIRE.

The American Tire Company, Montello, Mass., is manufacturing the Avon airless tire, which is constructed for commercial vehicles, although it is said that it will be made in the future for pleasure cars. Qualities claimed for the Avon are: Light weight, strong traction, non-skidding, non-puncturable and large mileage.

PREPARATION OF ANTI-FREEZING SOLUTIONS.

WHILE extreme cold weather is not anticipated for some time, freezing temperatures are likely to prevail in certain sections of the country and, if the motor vehicle be stored in an unheated building, preparations should be made to guard against damage to the cooling system by freezing. The use of an anti-freezing solution does not necessarily require one to withstand low temperatures at this season of the year. A five per cent. solution of alcohol will generally suffice as it will not freeze until the thermometer stands at 25 degrees Fahrenheit, seven degrees below the freezing point of water. The accompanying table will be of value in determining the proper strength of the solution, and the several ingredients available as well as percentages to use for varying temperatures are given.

The most common ingredients are alcohol, calcium chloride and glycerine, although there are several efficient chemical solutions which can be purchased already prepared.

Alcohol Solution.

The alcohol solution is favored because it is easily handled and is a clean mixture. It gives off an odor when heated, however, boils at 172 degrees Fahrenheit, and when used to withstand temperatures below zero will heat readily in milder weather. As it evaporates readily under such conditions, it requires attention and the use of a hydrometer to prevent the subsequent raising of the freezing point. In radiators having a tendency to leak, this mixture will find these openings on warm days. Denatured alcohol is not expensive and, as it may be procured readily, it is generally employed.

Calcium chloride, pure, is in the form of prismatic crystals, soluble in one-quarter of its weight in water, and dissolves easily in alcohol. The commercial form is not expensive and the process of dissolving it may be hastened by using warm water and stirring the solution. In preparation, one should have several strips of blue litmus paper for testing the mixture. If the paper changes to a red color, the fluid is slightly acid and should not be used until corrected. This is effected by using a slight quantity of milk of lime, adding until the color of the paper remains unchanged. Crystallized calcium chloride contains about 50 per cent. of water of crystallization and dissolves in about half its weight in cold fluid; consequently, eight pounds of the ingredient dissolved in half a gallon of water will make one gallon of the saturated solution.

Glycerine and Alcohol.

Glycerine and alcohol are favored by some, but the former is not recommended by some writers because of its alleged deteriorating effect upon the rubber piping. This should not be prohibitive, however, as the disintegrating effect on the compound of the hose is pronounced only when the fluid is hot. Glycerine possesses wonderful solvent qualities, dissolving most

substances that are soluble in water and some others, for instance, the metallic oxides. It occurs as an oily liquid of a specific gravity of 1.269, and its boiling point is 554 degrees Fahrenheit. It extracts water readily from the air and, when utilized as an anti-freezing solution, the connections should be made as tight as possible, for glycerine "creeps," the analogy being the creeping of the electrolyte on the terminals of a storage battery. This does not dry up, but rather increases, owing to the hygroscopic properties of sulphuric acid. Glycerine and alcohol, while more expensive, make a good mixture in that the former does not boil as readily as other solutions.

In using anti-freezing solutions, allowance should be made for the expansion by heat. Where water is employed in the radiator and the container is filled to the top, after a long run the radiator shows a loss.

ANTI-FREEZING SOLUTIONS AND THEIR FREEZING POINTS.

Calcium Chloride.		Degrees F.
1 pound salt—1 gallon water.....	Freezing point	27
2 pounds salt—1 gallon water.....	Freezing point	18
3 pounds salt—1 gallon water.....	Freezing point	1.5
4 pounds salt—1 gallon water.....	Freezing point	17
5 pounds salt—1 gallon water.....	Freezing point	39
Glycerine.		
Water 95%—Glycerine 5%.....	Freezing point	30
Water 90%—Glycerine 10%.....	Freezing point	28
Water 85%—Glycerine 15%.....	Freezing point	25
Water 80%—Glycerine 20%.....	Freezing point	23
Water 75%—Glycerine 25%.....	Freezing point	19
Water 70%—Glycerine 30%.....	Freezing point	15
Water 65%—Glycerine 35%.....	Freezing point	12
Water 60%—Glycerine 40%.....	Freezing point	5
Water 50%—Glycerine 50%.....	Freezing point	2
Water 45%—Glycerine 55%.....	Freezing point	10
Alcohol and Water.		
Water 95%—Alcohol 5%.....	Freezing point	25
Water 90%—Alcohol 10%.....	Freezing point	18
Water 85%—Alcohol 15%.....	Freezing point	11
Water 80%—Alcohol 20%.....	Freezing point	5
Water 75%—Alcohol 25%.....	Freezing point	2
Water 70%—Alcohol 30%.....	Freezing point	9
Water 65%—Alcohol 35%.....	Freezing point	15
Water 60%—Alcohol 40%.....	Freezing point	23
Water, Alcohol and Glycerine.		
Water 95%—Alcohol-Glycerine 5%.....	Freezing point	28
Water 90%—Alcohol-Glycerine 10%.....	Freezing point	25
Water 85%—Alcohol-Glycerine 15%.....	Freezing point	20
Water 80%—Alcohol-Glycerine 20%.....	Freezing point	15
Water 75%—Alcohol-Glycerine 25%.....	Freezing point	8
Water 70%—Alcohol-Glycerine 30%.....	Freezing point	5
Water 67%—Alcohol-Glycerine 33%.....	Freezing point	15
Water 60%—Alcohol-Glycerine 40%.....	Freezing point	23

This is due to the expansion and consequent overflow and sometimes to air pockets in the water jackets or piping, which space is replaced by the fluid. When such a loss occurs by evaporation or leakage, the solution should be brought up to its full strength; alcohol by tests with a hydrometer, and calcium chloride by the use of litmus paper. When these are not obtainable, a full strength solution should be added.

Previous to the use of anti-freezing solutions, the components of the cooling system should be thoroughly cleaned. A mixture of common washing soda and water can be utilized for this purpose. The crystals are added until no more will be dissolved and, after introducing in the radiator, the engine is run for some little time after which the mixture is removed.

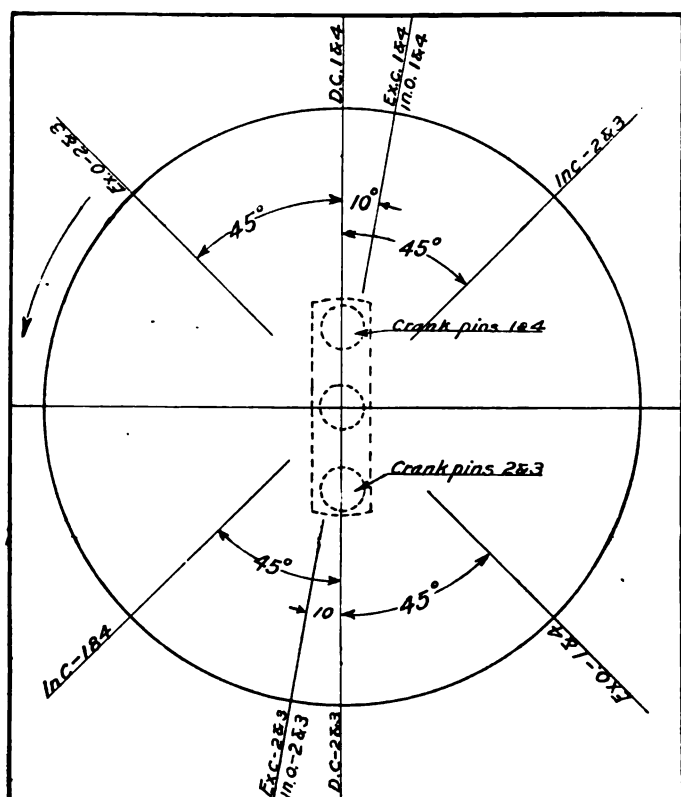
CORRESPONDENCE WITH THE READER.

Valve Timing—Reader, St. Louis, Mo.

We have a converted pleasure vehicle with a Wisconsin motor. The car was made by the Ideal Motor Car Company. Can you give us the valve timing of this motor, as we are to overhaul it?

The markings of the flywheels for the type A Wisconsin motor are shown in the accompanying illustration, the drawing depicting these when viewed from the rear of the motor. There are two sizes of flywheels, one $16\frac{3}{4}$ inches in diameter and the other an inch larger. These dimensions will have to be taken into consideration in retiming the valves.

As may be noted, the flywheel is marked off in degrees but, as but two dimensions enter into the work, it is a simple matter to lay off on the periphery of the wheel these degrees in inches. For example: The in-



Timing Diagram of Wisconsin Motor, Showing Opening and Closing Points of the Valves.

take valves open 10 degrees before dead centre and close 45 degrees before lower dead centre. The exhaust valves are similarly timed.

With the $16\frac{3}{4}$ -inch flywheel, 10 degrees equals $1\frac{15}{32}$ inches and 45 degrees $6\frac{37}{64}$ inches. With the larger flywheel, 10 degrees equals $1\frac{35}{64}$ inches and 45 degrees $6\frac{31}{32}$ inches. These dimensions apply to the circumference, and the measurements are made from the top and bottom centres.

The marking "In C" indicates intake closes, "In O", intake opens. Similarly the letters "Ex O" represent the opening point of the exhaust valve, and "Ex C" its closing point. The valve tappets are adjusted so that they begin to lift the valves at the points indicated in the diagram.

With flywheel in good condition the marking ought to be legible but, if it has been obliterated, new marks should be made to simplify future work on the motor.

Bosch Magneto—A. B. C., Boston.

As a reader of your publication I would like some information on the magneto fitted to the 1915 Overland machine. It is a Bosch, but is different from any I have ever seen. The driver of the car could not give me any information. Being interested in magnetos, would appreciate an explanation.

The magneto referred to is the Bosch type NU4, announced recently by the Bosch Magneto Company. A complete description of the instrument will be found elsewhere in this issue.

Differential—Information, Galveston, Tex.

What replaces the differential in a truck having a solid rear axle? In pleasure cars the differential is on the rear axle, but I fail to see how a truck with a solid rear axle can turn a corner without some form of a differential.

Differential or equalizing gears are employed in the type of commercial vehicle mentioned. They are incorporated in the jackshaft housing and their construction and operation is the same as those used on the pleasure automobile. For example: When the truck is turning a corner, the outside jackshaft sprocket turns faster than the inside, due to the equalizing gears.

Magneto for Ford—Ignition, Providence, R. I.

We employ a Ford car with delivery body, for taking orders, and it has given good satisfaction. Our driver, however, complains of the ignition system, and urges us to install a magneto. Would be pleased to have your opinion, ignoring the factor of cost.

The ignition system supplied with the car in question should give satisfaction. The writer's personal experience with the car fitted with a true high-tension magneto has been such as to recommend a magneto in preference to the standard equipment. Not only does the car start much more easily, but considerably more power is developed. The engine runs cooler in warm weather and decidedly more smoothly than with the coil ignition. Synchronization of the spark is obtained, a factor of decided importance, and not generally possible with a vibrating type of coil that has been in service for some time. Magnetos and complete attachments for fitting are made by the Splitdorf Electrical Company, Newark, N. J.; the Bosch Magneto Company, New York City, and the Eisemann Magneto Company, Brooklyn, N. Y.

Use of Hot Air—X. Y. Z., Burlington, Vt.

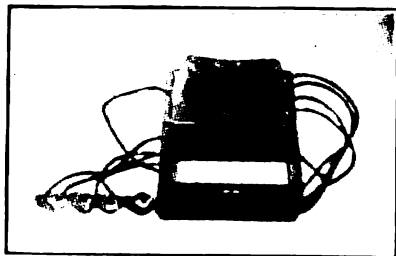
Is there any benefit to be obtained by the use of the heat of the exhaust with the carburetor and, if so, why?

The benefits obtained from heating the air passing through the carburetor are: Raising its temperature so that fuel drawn from the spraying nozzle is more completely broken up and vaporized, and the entrance of road dust or other foreign elements is prevented. Heating the air is especially beneficial in cold weather when the fuel does not vaporize as readily as in warm weather.

NEW COMMERCIAL CAR ACCESSORIES.

DINSHAH ENGINE TESTER.

To locate faulty operation of the ignition system requires considerable experience and to make easy the work of



finding the cause of trouble the Dinshah Sales Company, 735 Seventh avenue, New York City, has brought out a device termed the Dinshah engine tester.

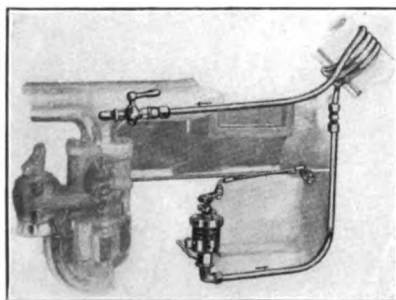
As may be noted by the accompanying illustration, it resembles a camera box, and an opening is provided for inspecting the operation of the electrical apparatus. By observing the color and size of the spark within the box the operator is enabled to ascertain whether or not the particular circuit is working correctly, as well as a dead connection. The Dinshah tester is stated to be adaptable to all electrical motor vehicle apparatus.

GO MOTOR SPEEDER.

The advantage of utilizing heat for raising the temperature of the fuel is well known, and the use of the warmth of the exhaust gases is standard practise with a large number of car manufacturers. A device operating on this principle is the Go motor speeder, manufactured by the Go Motor Speeder Company, Three Rivers, Mich. It differs in a number of ways from the usual devices, the most noticeable variation being an automatic control of the extra air admitted.

The heat is obtained by a coil of tubing around the exhaust manifold. One end of the pipe is tapped into the intake manifold above the carburetor, and the other end is attached to the device itself. The last-named member is very compact and air is drawn through it by the suction of the piston. In passing through the coil about the exhaust manifold the air is considerably increased in temperature and when received into the intake manifold the heated air greatly increases the vaporization of the gasoline and converts it into a quick burning gas that is productive of much greater power when measured by a given volume of fuel. This insures thorough economy and increases the efficiency of the engine to a material degree.

One of the features of the device is the automatic control of the air admitted. The bell crank lever regulating the amount of air is connected by linkage with the throttle control, so that the air supply is augmented and in proportion to the speed of the motor. The maker states that the use of the Go motor

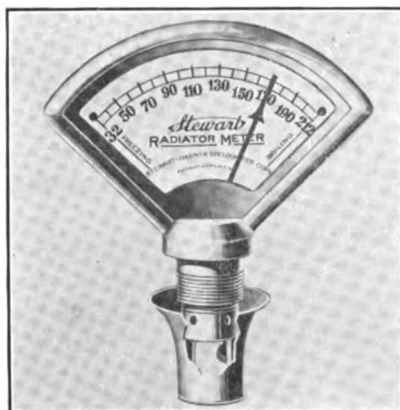


speeder will increase the mileage to a gallon of fuel from 30 to 50 per cent., and that starting is made easier, as the mixture left in the cylinder is more homogeneous. The device is moderately priced and is easily installed.

STEWART RADIATOR METER.

The Stewart-Warner Speedometer Corporation, Chicago, Ill., has made a number of improvements in the Stewart Radiator meter, shown in the accompanying illustration. While similar to the usual type in construction internally, it is fitted with a small cup which appears like a telephone mouthpiece. This cup is attached to the meter from underneath the filler cap of the radiator, and when the radiator is filled with water and the engine started, the water accumulates in this cup and the temperature of the cooling fluid is registered.

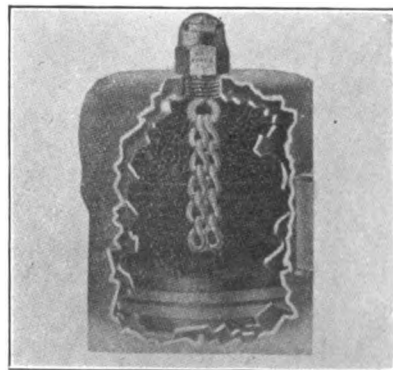
The cup water has the same temperature as the radiator water, and consequently the condition of the water sys-



tem can be told at a glance. Should the level drop to the danger point and the cup become dry, the meter will register accordingly. The reverse side of the meter is fitted with special name plates of the different makes of cars.

MASCO CYLINDER CLEANER.

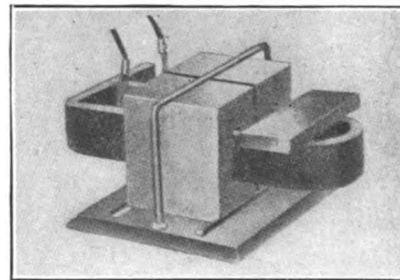
The Masco cylinder cleaner, a device manufactured by the Milwaukee Auto



Specialty Company, Milwaukee, Wis., is designed to remove carbon from the cylinders and pistons of gas engines. This cleaner consists of a body, constructed like the body of a spark plug, with a perforated cap. A swivel chain is attached to the bottom, and by inserting this chain through the spark plug opening into cylinder and screwing body into place, the chain is ready for work. When the engine is started the head of the piston strikes the chain, throwing it against the head of the cylinder, displacing deposits.

PEERLESS CHARGER.

The Sauermaann Motor Company, Rock Island, Ill., has brought out a magnet charger which it is claimed will suc-



cessfully remagnetize any of the magnets of a magneto. The Peerless magnet charger is of simple construction and is provided with two terminals to which are attached the leads from a six-volt storage battery of six dry cells. The maker states that the device can be operated by anyone and that by using it at frequent intervals the magneto is maintained in an efficient condition. It is stated that the charging operation requires from 15 seconds to a minute, according to the state of the magnets.

POLSON TIRE BOOTS.

Designed to cover cuts in tires or small blow-outs, the Polson Bros. Manufacturing Company, Kansas City, Mo., is manufacturing a tire band three inches wide, designed to go on the outside of the shoe. This band is made of steel studded chrome leather and has two flat hooks on either side of the patch. To preserve a tire and keep a small rent from ruining an otherwise good shoe, this patch slips over the tire and the hooks, as shown in the accompanying illustration, fit under the steel rims.

The object was to produce a protector that could be placed on any tire quickly, and which would endure under the extreme strains, avoiding the lacing method that had been found by experience to require time to apply and necessitated frequent adjusting because of the stretching of the laces.

It is simple to attach, and the manufacturer says it will wear a long time and protect the tire to the fullest extent. These patches are made for three, 3½, four, 4½ and five-inch tires.

The Polson Company also makes a steel studded rubber hook-on boot of the same design, and 6½ to 8½ inches long. The size is optional. A steel studded leather boot of the same size is made.

An extra heavy inside blow-out patch is manufactured by this concern. This patch is made of red rubber and is as heavy as the tire itself. This has strong double flaps, which are clamped under the rims and cut off, as is the ordinary inner patch. These patches are made to fit five sizes of tires.



LOZIER PLANS REORGANIZATION.

Following the appointment of a temporary receiver for the Lozier Motor Company, Detroit, Mich., immediate steps were taken for the reorganization of the company. The action of receivership was taken on the petition of the Detroit Pressed Steel Company, the Welded Steel Barrel Company and the Brightman Nut & Manufacturing Company. The decision of the court on the appointment of the receiver was that the Lozier Company suspend all operations with the exception of the service department, which will be continued for the benefit of the present Lozier owners.

The court appointed the Detroit Trust Company receiver, and that concern immediately took full charge of the Lozier plants in Detroit and Plattsburg, N. Y. An inventory is now being taken, and it was estimated that three or four weeks would be required for this work. The reason given by the court for ordering the suspension of business was that it considered such an arrangement would be more profitable in case there was no reorganization.

The Lozier legal representatives told the court that the company was solvent, but that it needed more money to carry on the production of cars for the coming season. The liabilities were given at approximately \$2,500,000, and the assets were placed at \$4,300,000.

Should the Lozier Company fail to file an answer to the petition of the three creditors within a reasonable period, the court will adjudicate it a bankrupt.

UNITED STATES TO BUY TRUCKS.

According to present indications, it is more than likely that the United States government will be in the market early in 1915 for a large fleet of motor trucks. At the present time Postmaster-General Burleson is conferring with a special committee of postmasters and postoffice department officials looking to the substitution of government-owned motor trucks for screen mail wagons.

Next June contracts for screen mail wagons expire in 30 cities, and should the postoffice department decide that motor trucks are efficient, these will not be renewed. Considerable time has been devoted lately by the department in trying out motor trucks, and it is believed by many officials that the screen type of wagon will soon be replaced by the more speedy motor trucks.

According to the report that is being drawn by Director Berger and Chief Lauer of the Columbus, O., fire department, between \$60,000 and \$70,000 should be expended this year for motor apparatus. These requests will be submitted to the city council.

The Montreal Automobile Trade Association will hold a motor car show early in 1915. A commercial car section will be included.

BOSTON WILL ENFORCE GARAGE LAW.

Massachusetts garage owners will apparently be compelled to obey the new garage law. Deputy Chief Neal of the Massachusetts state police, has started members of his force through the state to learn those who are obeying and those who are not obeying the new law. The statute was passed at the last session of the Legislature. The general provisions became effective May 15 last, but garage owners were given until Oct. 1 to perfect structural changes, if such were necessary, to conform with the provisions of the law.

All garages housing over four cars must have concrete floors, and the first story ceilings must be covered with metal lath and hard plaster. Stairways and elevator wells must be inclosed with fire resisting materials, iron doorways, frames and automatic closing doors in partitions. The officers may order sprinkler systems installed if they think these are necessary. This law has meant the reconstruction of numerous garages, and many new structures have been built, as it was impossible to change old wooden structures to meet specifications.

DOANE LOW PLATFORM TRUCK.

The Doane Motor Truck Company, San Francisco, Cal., is building a low platform six-ton truck, especially designed for the hauling of heavy material, such as stone, machinery, structural steel, boilers, etc. The frame is just high enough from the ground to permit sufficient clearance for ordinary purposes.

The company makes but one type chassis. The total overall length of the truck is 20 feet 9 inches, and it has a 14-foot loading platform. This platform overhangs the rear axle four feet and, without load, it is 24 inches from the ground. The spring depression under load brings it to within 22 $\frac{1}{4}$ inches from the ground. The frames are suspended on springs in the conventional manner. The clearance over the axle is obtained by deep drops in the axles and underslung springs. The drive is by side chains.

At the eighth annual show of the St. Louis Automobile Manufacturers' and Dealers' Association at Forest Park Highlands, Oct. 5-10, commercial vehicles were a part of the exhibition. Fifteen manufacturers and dealers exhibited that number of motor trucks and wagons.

The Standard Motor Car Company, Warren, O., has received an order from the British government to furnish a chassis for the war department. The body will be furnished by the British government.

J. F. Reddick, formerly a director of publicity with the Goodyear Tire & Rubber Company, Akron, O., has been appointed advertising manager of the Stromberg Motor Devices Company, Chicago, Ill.

THE MOTOR TRUCK AS A GUN TRANSPORT.

"IN ADDITION to ordinary touring and commercial vehicles used for the transport of officers and supplies, a few widely different types of specially constructed military motor vehicles are being used in the present war", says Eric W. Walford in the current issue of *The Autocar*, an English motoring print, "and from the evidence that a layman can accumulate, these vehicles seem to have justified their employment. It seems probable, therefore, that similar types will form a regular part of every army's equipment and that, before long, this branch will be developed considerably and a number of different kinds of vehicle be used.

Scouting Vehicles.

"Thus there will be lightly armored cars of high speed for scouting, and we know that such cars have been used with success in Belgium by the Germans. Such cars are hardy fighting machines, and do not, as far as I am aware, all carry machine guns. There is,

is directed to the construction shown at Figs. 1 and 7. This vehicle comprises, roughly, a closed car built up of armor plate with a machine gun at the rear which is mounted in a rotating turret on the top of the car. The advantage of arranging the gun as high as possible will be obvious.

Turret Mounting.

"The turret is provided with a circular flange that rests upon the edge of the aperture in the roof of the vehicle, and under this flange is a rubber ring B (Fig. 7) used to clamp the turret in order to prevent moving during firing. The turret resembles somewhat an umbrella mounted on a central shaft or pedestal supported from the frame of the car. This shaft is in two parts, with a screwed connection on which works a nut with the hand wheel C. By rotating the hand wheel the cupola may be raised and lowered slightly. When lowered, it is forced down on the rubber ring, and is absolutely immovable. When the gun is to be

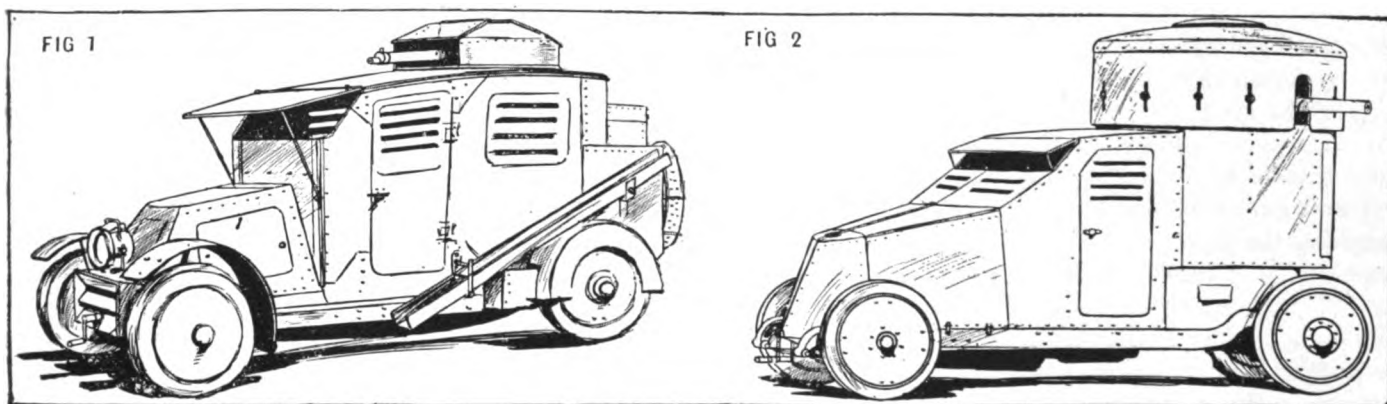


Fig. 1—Charron Armored Car with Machine Gun in Revolving Turret; Fig. 2—Schneider Military Car Equipped with Gun in Revolving Turret.

however, another type, which could give a very good account of itself in offensive work, and which might be termed a 'fighting machine'. There would be, moreover, cars for the rapid transport of guns, and modified forms in which the guns could be used when in place upon the car. It will be obvious that this last type would be particularly useful when attacking hostile air craft. When it is considered that the air craft would probably be travelling at any speed between 50 and 100 miles an hour, and that the gun carriage probably would not do more than 30 miles an hour, it will be obvious that there will be considerable benefit in being able to fire the gun without having to unlimber it, which would necessarily take considerable time.

Fighting Machines.

"The three latter types of vehicles, that is, the motor fighting machine provided with machine guns, the gun carriage, and the motor propelled gun, have all been produced by the leading Continental constructors, so that the details of the different types may probably be of interest.

"Considering the fighting machine first, attention

trained afresh, the hand wheel is rotated to raise the turret slightly, allowing it to be turned in the required direction. The machine gun is mounted on a cross bar D, with the usual elevating gear, etc.

"The front of the car is provided with a hinged shield A that may be instantly dropped; behind this there is carried from the dashboard a lamp with a movable shutter that may be utilized for signalling. The radiator in this type of car is arranged low down in front, and it is enclosed by steel plates with louvers for the passage of the air. Ammunition is stored at the back in the receptacle E, while on each side of the vehicle, just over the rear wheels, is carried a channel steel ramp or gutter, which can be used to bridge over ditches, etc. This machine is the production of the Societe Automobiles Charron, Giradot et Voight, the makers of the C. G. V. touring car.

Special Forms.

"Schneider, the well known maker of Le Creusot, has produced for use on armored cars a special form of turret, which is shown at Figs. 2 and 8. The turret comprises a lower cylindrical part that is at-

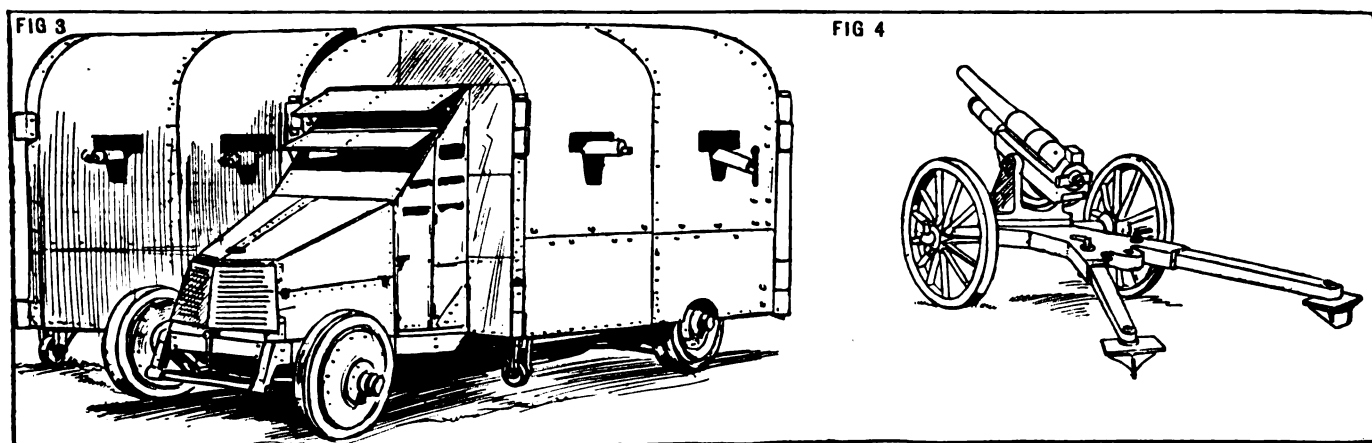


Fig. 3—De Sautelron Motor Battery of Machine Guns—The Sides of the Vehicle Can Be Swung Out to Bring All the Guns in Line; Fig. 4—Krupp Motor Gun Carriage, Showing the Method of Anchoring During Action.

tached to the frame of the car and is a fixture. Above this is the rotatable turret that is provided with rollers A (Fig. 8) running on an inwardly projecting ring on the fixed turret. This ring is toothed on its inner side, and engaged by the gear wheel B. The gun is carried on a pair of brackets from a part of the rotatable turret, and these brackets support the shaft on which the gear wheel B is fixed. Rotation of the gear wheel B is effected by means of the bevel gearing at C and a chain connected to a spindle D. On the gun is provided a kind of cycle seat E, and the spindle D carries cranks and pedals. In this way the gunner, seated on the saddle, is able, by pedalling, to rotate the turret and gun, leaving both hands free for aiming and working the gun.

Ingenious Motor Battery.

"A most ingenious form of motor 'battery' is the production of an Italian artillery major. This vehicle is provided with a number of machine guns, and constitutes really a kind of mobile fort. As indicated at Figs. 3 and 9, the main external appearance of the vehicle somewhat resembles the C. G. V. construction shown at Fig. 1, the vehicle being practically enclosed by armor plating. The sides, however, are not fixtures, but are hinged at the front and rear, while each side is integral with a part of the platform.

"The platform, therefore, is divided longitudinally into two parts, and on each side are mounted two machine guns, which are represented by the black dots shown in the small diagrams at Fig. 10. There are also two machine guns which are a fixture in the centre of the car, these facing fore and aft respectively. By turning the side screens around into the various posi-

tions shown at Fig. 10 the car may be used for advance or for rear guard attacks, and it may be effective also in a lateral direction without turning the car, in each case the gunners being under shelter. As may be noted from Fig. 9, the side screens are supported on casters to allow them to be rotated easily. The arrows in Fig. 10 show the directions of gun fire with the side screens in different positions.

"Motor gun carriages will next be considered and, from the following, it will be seen that the Germans, through Krupp's, have given a great amount of attention to this point. One construction that is in use in the present war is shown at Figs. 11 and 12, and dates from as long ago as 1908. Here a strong motor lorry is utilized, and the platform at the back is specially constructed with channel tracks for the reception of the wheels of the gun carriage, the barrel of the gun projecting forward by the side of the driver and over the bonnet, which latter is not shown in the accompanying drawings. The feature of this construction is the simple method by which the gun is secured.

Loading Features.

"This is effected by using the ramps A by which the gun is drawn on to the platform. The smaller illustration shows the gun about to be drawn on to the carriage, for which purpose it is run up the ramps against the stop B, the wheels dropping into a recess C. The ramps, which are hinged to the back of the vehicle frame, are then turned over so as to rest upon the tops of the wheels, and are secured to the ends of the stops by spring catches. The spade D, at the end of the trail of the gun, is arranged to bear against the frame of the car. In another arrangement of the

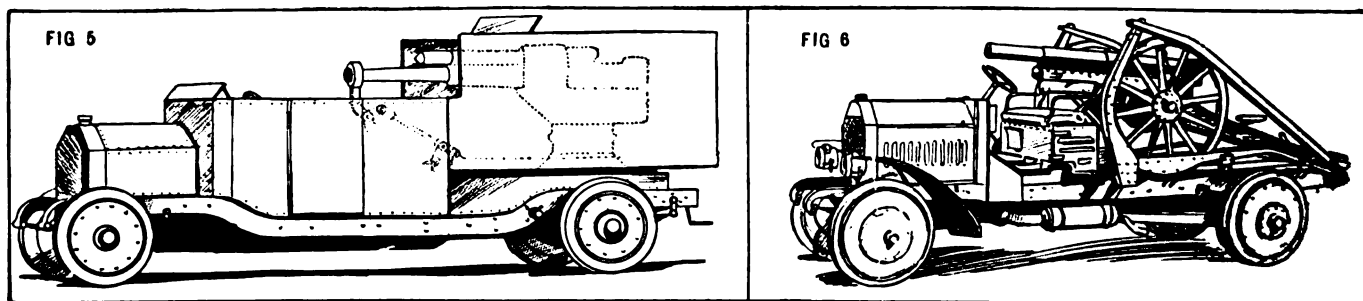


Fig. 5—Krupp Heavy Vehicle Carrying Mounted Howitzer, and Fitted with Anti-Vibration Device; Fig. 6—Krupp Gun Transport, as It Would Appear with Gun in Position.

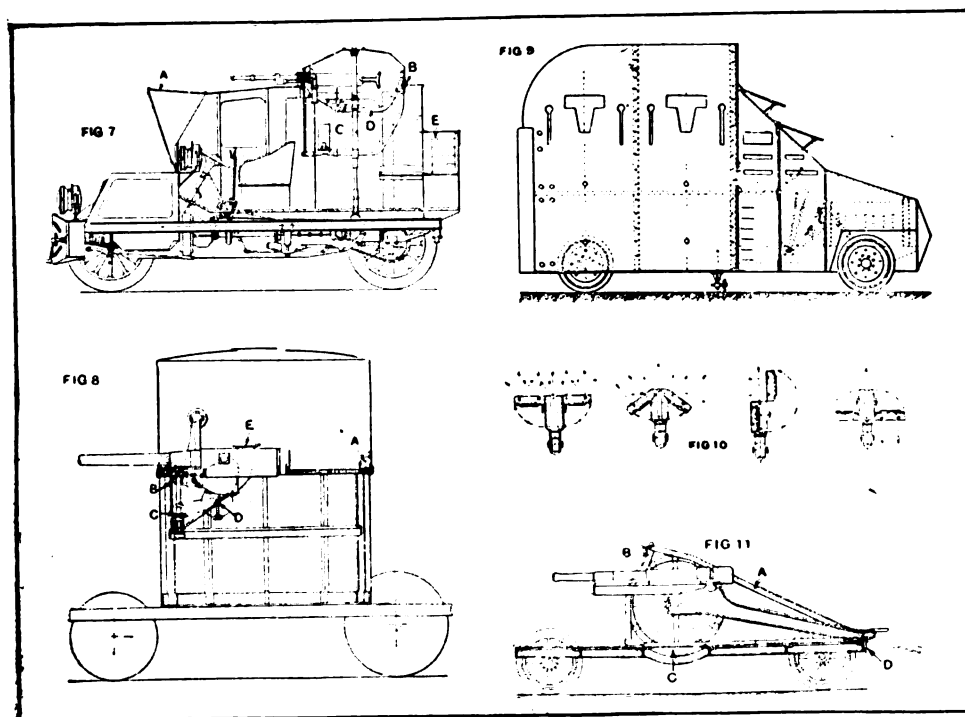


Fig. 7—Arrangement of Charron Armored Car; Fig. 8—Disposition of Gun and Turret Mechanism in Schneider Military Car; Fig. 9—Outside Elevation of De Sautelron Motor Battery; Fig. 10—Diagram Showing Lateral Radii of Gun Fire Possible with the De Sautelron Arrangement; Fig. 11—Krupp Motor Gun Carriage, with Gun in Position of Limber.

same idea, which is shown at Fig. 13, the ends of the ramps are adapted to grip the axle of the gun carriage.

"It will be observed that this provides only for the transport of the gun, and does not allow of it being used without being unlimbered. In a subsequent design, which is shown at Figs. 4 and 14, the gun may be used when it is on the car, as well as in the ordinary way. In the drawings is shown a gun that may be used for high angle firing, and it is designed ostensibly for offensive purposes in connection with air craft. The gun is provided with a pivot mounting on its under carriage, so that it may be rotated completely in a horizontal plane. It may also be turned vertically through a very wide angle. Here again there are provided two ramps A that normally are stowed away on the platform of the car, but may be put into the position shown by the dotted lines at Fig. 14 to facilitate unloading of the gun. The ramps are, therefore, of channel section. Each ramp, also, has attached to it the usual spade B, which anchors the gun when used in the field, and the ramps are fitted on the rear end of the trail, as shown at Fig. 4. The car is provided with ammunition boxes.

Late Krupp Model.

"A much larger gun, mounted upon a motor vehicle, is a later Krupp production. Here again, as seen by the drawing at Fig. 5, the gun is provided with a pivot mounting upon the frame of the car, and it is housed in a kind of turret attached to the platform that is provided with ball bearings for its rotation. The two rotate together, but there is no positive connection between the platform and the gun, a provision that precludes the possibility of the shock from the

gun being transmitted to the platform. The sighting mechanism, etc., is naturally somewhat delicate and, whilst the gun is being transported at high speed, it is subjected to vibration that would be detrimental to its mechanism. Therefore, the gun is secured rigidly by means of a cap that grips the muzzle. This cap is pivoted to a cross member of the frame, and is connected by a link with a coupling that is attached to the platform. Therefore, when this coupling is secured, the platform is fixed and, by means of the link, the gun is also held rigidly. The car is constructed to carry something over 100 rounds of ammunition.

"In most cases the chassis employed is that of a modified motor lorry, which the motor car manufacturers could supply without difficulty".

R. W. White, manager of the Columbus, O., branch of the Goodyear Tire & Rubber Company, Akron, O., has been assigned to manage the Chicago, Ill., branch. W. W. Magill goes to the Columbus branch as manager.

E. E. Gerlinger of Portland, Ore., northwestern distributor for the Federal truck, has been awarded a handsome prize by the factory for handling the largest percentage of business during the month of August of any United States agent of the Federal Company.

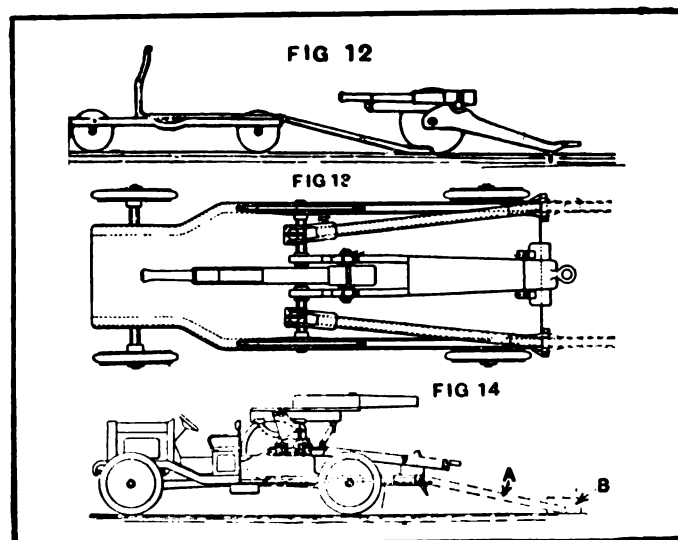


Fig. 12—Krupp Motor Gun Carriage with Gun Removed; Fig. 13—Plan of Modified Krupp Motor Gun Carriage, Where the Ramps Are Made to Grip the Carriage Axle; Fig. 14—Krupp Motor Gun Platform: A, Showing Ramps Used When Removing the Gun; B, the Spade Used to Anchor the Gun When Employed in the Field.

GENERAL MOTORS BIG YEAR.

Largest Production in History of Company Shows Good Profits.

The General Motors Company, New York, N. Y., has declared a regular semi-annual dividend of 3½ per cent. on its preferred stock, payable Nov. 1, to stock of record Oct. 15.

For the company's fiscal year, ended July 31, 1914, the gross sales were \$85,373,303, as against \$85,603,920 for the fiscal year ended July, 1913. The 1914 sales represent approximately 10 per cent. more cars at correspondingly lower prices. The net profits were \$7,947,413, a decrease of \$336,727 over last year.

The balance, after the payment of the accrued interest on the six per cent. notes, was \$7,249,734, which was \$209,737 under the figures of 1913, and the undivided profit, after payment of the preferred dividends, was \$6,201,055, a decrease of \$209,882. This, added to the previous profit and loss surplus, made a total of \$9,146,434, an increase of \$1,472,902. There was charged off \$2,457,007 for depreciation, etc., leaving a final profit and loss surplus of \$6,689,428, an increase of \$3,744,048.

A summary of the income account for the fiscal years ending July 31, 1914, 1913 and 1912, follows:

	1914	1913	1912
Net profits subsidiary companies	\$7,947,413	\$8,284,140	\$4,838,449
General Motors' share	7,819,968	8,184,053	4,746,757
Interest on notes	570,235	724,581	850,463
Surplus	7,249,734	7,459,471	3,896,293
Preferred dividends	1,048,679	1,048,034	1,040,211
Final surplus	6,201,055	6,410,937	2,856,088

In the case of the net profits of the General Motors subsidiary companies, this figure of \$7,947,413 is after deducting manufacturing, selling and administration expenses and maintenance and depreciation charges. The final surplus of \$6,201,055, after allowing for preferred dividends, is equal to 37.57 per cent. on the \$16,501,783 common stock. This compares well with 38.90 per cent. for the previous year.

The total value of real estate, plants and equipment, as appraised, is \$21,515,065. For patents, agreements, etc., there is recorded \$471,200, and for miscellaneous investments, \$352,734.

The net working capital of the General Motors Company increased from \$23,141,061 in 1913 to \$24,331,333 this year. This is worked out as follows:

Current Assets.		
	1914	1913
Cash	\$13,452,663	\$6,236,251
Notes and accounts receivable	3,358,790	3,449,335
Inventories	11,642,370	18,170,907
Prepaid expenses	387,578	412,756
Total	\$28,841,402	\$28,269,249
Current Liabilities.		
	1914	1913
Accounts payable	\$3,772,123	\$4,821,744
Notes		300,000
Interest, taxes, etc.	1,000,247	1,048,970
Total	\$4,772,370	\$6,150,714
Deducting three months preferred dividend	262,241	262,526
Net current liabilities	\$4,510,069	\$5,088,188

Net current assets	\$28,841,402	\$28,269,249
Net current liabilities	4,510,069	5,088,188
Working capital	\$24,331,333	\$23,141,061

In his statement to the stockholders, President Nash says in part:

In view of the considerable undivided surplus income for the year, your directors have deemed it wise to write off \$972,419 from the book value of patents, agreements, etc., and also to appropriate from surplus the sum of \$1,483,208 as an additional reserve for depreciation of plants and equipment. The above amount written off from patents, agreements, etc., comprised entire sum carried in that account by all subsidiary companies, except the McLaughlin Motor Car Company, Ltd. The General Motors Company owns slightly less than one-half the capital stock of that company, whose agreements, etc., \$471,200, are being written off in annual installments.

The sole outstanding funded debt July 31, 1914, consisted of \$7,852,000 six per cent. first lien notes, maturing Oct. 1, 1915. In September, 1913, the company paid the balance of \$1,000,000 due Oct. 1, 1913, on account of sinking fund, and in the spring of 1914 paid in advance to the trustee the full \$2,000,000 sinking fund installment due Oct. 1, 1914.

Export business continues to make satisfactory progress, several new and promising avenues of business having been opened up during the past year. Financial disturbances abroad will undoubtedly postpone the development of export business, the volume of which does not yet, however, constitute an important part of the total sales.

The business of your companies for the new fiscal year beginning Aug. 1, 1914, so far has been \$1,000,000 ahead of the corresponding period of the preceding year, but if the present disturbed financial conditions continue it is too much to expect that they will not be felt during the current year.

The policy of simplifying the corporate organization has been continued and several unnecessary subsidiary corporations have been wound up during the past year.

WEYMOUTH GENERAL MANAGER.

F. M. Weymouth has been appointed general manager of the A. C. C. O. Oil Company, Boston, Mass., manufacturer of the well known Acco lubricants. Mr. Weymouth was formerly connected with the Mellin's Food Company and the Hunt-Spiller Company and the experience thus gained has given him a grasp of marketing details that will be of great assistance to him in the proper placing of the Acco products before users in other mercantile fields.

Mr. Weymouth will make his headquarters in the Acco building on Commonwealth avenue, Boston. The officers of the company are: Gordon Dexter, chairman of the executive committee; W. A. Shafer, president; W. B. Leach, vice president; Rosecrans W. Pillsbury, treasurer; Capt. John J. Crowley, secretary, and James M. Satterfield, attorney.

REDDICK JOINS STROMBERG.

J. F. Reddick, formerly a director of publicity with the Goodyear Tire & Rubber Company, Akron, O., has been appointed advertising manager of the Stromberg Motor Devices Company, Chicago, Ill.

W. G. Northup, factory representative of the Willys Utility truck, who has been spending a month on the Pacific coast, predicts a large truck business for California this year.

Stroud, Bridge & Connors, Bay City, Mich., will erect a two-story factory, 90 by 110 feet, for the manufacture of automobile accessories.

FIRE DANGERS FROM FILLING GASOLINE TANKS.

DURING the recent annual convention of the Massachusetts State Firemen's Association at Athol, Mass., an address was made by Walter L. Wedger, chemist in charge of the department of explosives and inflammables of the Massachusetts state police service, which dealt with the problems of handling and storing gasoline in connection with the use of motor vehicles.

Mr. Wedger's statements, based on investigation and experiment, may appear to be radical, yet they were made with the approval of the state police service to inform the state firemen of conditions they would frequently meet with and which ought to be guarded against. He pointed out that there were approximately 75,000 motor vehicles in the state, and about 25,000 garages, public and private, of all sizes. Both machines and garages are constantly increasing. Because nearly all of the machines use gasoline for the generation of power, and are obliged to have some safe and convenient base of supply, as well as adequate shelter, the task of framing regulations governing the construction and maintenance of garages and the keeping and handling of gasoline, from a fire hazard viewpoint, is not only of great importance to the general public, but is a subject that must be very carefully handled.

After illustrating the very general use of gasoline for motor fuel for industrial and commercial vehicles, he stated that motor fire apparatus had become almost indispensable, and gasoline is quite as necessary for pumping as it is for motive power. In fact gasoline was almost as necessary for extinguishing fires as is water. He looked forward to the time when Standard Oil motor truck tanks shall respond to third alarm fires to provide fuel.

He maintained that experience had proven that the underground system of gasoline storage was practically safe, the danger being largely in handling the fluid. Underground tanks should be placed not less than two feet below the surface of the ground, and if within 10 feet of a cellar or other open area which is below any part of the buried tank, it should be imbedded in cement concrete, not less than 10 inches in thickness. Such tanks should be constructed of steel plate from 3/16 to 1/4-inch thick, well covered with asphaltum varnish to prevent rust.

Usually three pipes lead from the top of the tank, the filler pipe, the draft pipe and the vent pipe. The latter extends from the top of the pipe to a point four feet above the roof of the building, it being necessary to conduct off the residual vapor forced out as the tank is filled. When drawing gasoline from an underground tank by a pump a type of pump that holds the gasoline in the draft pipe is better than one that will not so retain the fuel, because with an empty pipe vapor is pumped for a short time before the fluid is drawn into and through the piping.

The paper pointed out the dangers of handling gasoline that are little known, yet, according to Mr. Wedger, are well authenticated and can be depended upon as being fully established. This portion of the paper follows:

"The act of drawing gasoline from a pump and filling the tanks of cars by means of a hose or a can, through a funnel covered with chamois skin for the purpose of removing the water and dirt from the gasoline, has been known to cause a number of fires by the generation of frictional electricity. For a long time mysterious fires occurring during this process of handling gasoline have been reported to our office.

"I was just as skeptical then of the fact that these fires were caused by frictional electricity, as the general public is now. During the early part of last April a fire occurred at the Cambridge garage of the Metropolitan Park Commission while they were filling a car with gasoline by pouring it into a funnel through a chamois skin strainer from a five-gallon can. To make the funnel set upright on the car tank they had placed a piece of wood with a hole in it over the filler hole of the tank, thereby insulating the funnel from the metal of the tank. After a few quarts of gasoline had passed through the chamois skin, the man happened to bring the pouring can near to the metal edge of the funnel, when a spark jumped from the one to the other and set fire to the gasoline vapor arising therefrom. Quick action with extinguishers saved the car. The man insisted he saw and heard the spark, and believed he could cause it again in my presence; so armed with a golf leaf electroscope used to show the presence of static electricity in any substance, I proceeded to make a number of tests. The officials of the Standard Oil Company, both in Boston and New York, as well as several engineers and technical men, were very much inclined to disbelieve what they termed a theory, so I invited them to be present. We imitated the conditions as they were at the time of the fire, except that we took it to the open floor of the garage. We caused the spark by simply pouring gasoline through a chamois skin covered funnel insulated from the floor, and all present saw it.

"A chauffeur in a private garage at Brookline hung a five-gallon can by the bail, on the hook of a common self-measuring pump, the bail having a wooden handle, which insulated it from the metal of the pump. He had drawn about a gallon when a spark jumped from the can to the pump and set fire to the gasoline. He threw the can out of the open door and after extinguishing the fire and desiring to fill his car, he repeated the operation with the same can with the wooden handle and it caught fire the second time. After that the man refused to go near the pump and went to a public garage to get his car filled.

"Not long after that another chauffeur in the same town proceeded to fill his car from a pump by means

of a 16-foot rubber hose, to the end of which was fitted a nozzle shut-off of metal. While one man was doing the pumping, the other held the nozzle near the car tank, but did not bring it in actual contact. A spark, which he describes as half an inch long, jumped to the tank and set fire to the gasoline.

"Several fires have occurred recently at one of the Albany oil stations, evidently caused by the generation of frictional electricity in a canvas spout used to convey gasoline to tank cars. The canvas was covered with a coating of shellac and the spout hung from an overhead pipe, the lower end being in or near the manhole of a tank car, but not touching the metal of the tank. Recent tests show that the friction of gasoline passing through this spout and rubbing against the shellac coating caused the generation of between 400 and 500 volts of electricity".

IMPORTING BRITISH AND ITALIAN CARS.

New York City agents for French, German and Belgian automobiles are receiving no shipments from Europe. Dealers in English makes are able to obtain a few cars and the dealers handling Italian cars are receiving all the cars they want. The Italian government has given permission for the exportation of pleasure cars of 30 horsepower and less.

E. R. Hollander, president of the Fiat Motor Sales Company, New York City, states that the factory has shipped them more than 180 cars since the beginning of the war. "As automobiles are contraband of war", says Mr. Hollander, "our factory was unable to sell any of the stock on hand to any of the warring nations after hostilities opened. So the automobiles were shipped to America. The government, which seems to be expecting war, has placed an embargo against the exportation of commercial motor vehicles".

R. W. Schuette, American agent for the Rolls-Royce, states that he expects to handle about 50 cars in the next few months. He has received a dozen chassis and there are a number now on the way.

GOODYEAR BUYING COTTON, TOO.

The Goodyear Tire & Rubber Company, Akron, O., is buying bales of cotton and placing these in their show windows in the branches in the cotton belt.

The Western Fixture Company, Milwaukee, Wis., a large welding concern, has bought the equipment and stock of the defunct American Welding Company, also of Milwaukee.

W. Robinson, former automobile editor of La Presse, a Montreal newspaper, has become identified with the Wagenhals Motor Car Company, Detroit, Mich.

MILBURN WORM DRIVE ELECTRIC.

The Milburn Wagon Company, Toledo, O., is placing an electric coupe, a roadster and a delivery wagon in the market this month. The pleasure cars have graceful bodies, and both these and the delivery vehicle equipment are extremely light. The driving mechanism consists of a General Electric motor and controller, having four speeds forward and two in reverse. Horizontal levers are used for the controls. The conventional shaft is employed, this being connected to a three-quarters floating rear axle equipped with worm gears. Rear wheel brakes are fitted with Thermoid lining, and are internal and external. An alarm will ring in the event the power is turned on while the brakes are applied.

A 20-cell Philadelphia battery is used, and the maker claims that 20 miles an hour may be obtained, with mileage of from 60 to 75 miles for a charge. The battery rating is 180 ampere-hours. The coupe and roadster bodies are mounted on a 100-inch wheelbase chassis, which is equipped with cantilever springs both front and rear. This gives a low body effect.

The delivery wagon is mounted on a 90-inch wheelbase chassis. This has the same mechanical characteristics as the passenger cars, and there are an extremely wide range of body styles. The battery capacity of the delivery car is the same as the pleasure cars, 180 ampere-hours, and the maximum speed is 17 miles an hour, the normal 14, and the mileage limit 40 to 50 miles on a single charge. The same equipment applies to all three models, namely: Two six-inch front lamps, tail light, bell, meter, clock, tire pump, hydrometer, jack, tools, etc. The tires included as standard equipment are Goodyear electrics, 30x3½, or Motz cushion, 32x3½, at extra cost.

UPHOLD SEPARATOR VETO.

Mayor Mitchell's veto of the separator bill has been upheld by the Board of Aldermen, the necessary two-thirds vote required to pass the bill failing to materialize. The garage owners of New York City, however, are still fighting the measure and have established a paper to carry on the protest. This will be published frequently and will be devoted exclusively to the status of the separator fight.

The Elbert Motor Car Company, Seattle, Wash., has located its plant at 2012 Fifteenth avenue, west, in that city. In addition to manufacturing a cyclecar, this company will also make a light delivery car, with a carrying capacity of 500 pounds.

The United States Motor Truck Company has been incorporated in Covington, Ky., with a capital of \$250,000. The incorporators are R. C. Stewart, B. Bramlage and M. H. McLean.

ROAD BUILDING WILL CREATE BIG MARKET.

National Development of South American Highways and Demand for Trucks and Construction and Agricultural Machinery Will Offset Loss of European Exports.

REMARKABLE road development in some sections of South America is the reason to believe that within a comparatively short time the demand for motor wagons and trucks will be very largely increased, and that logical economies will create a very substantial market for machines in most of the nations. The Latin-American countries have taken up highway development from the realization of the necessity of obtaining quick and economical transportation.

There is absolute certainty that the construction of roads will impel the settlement and the cultivation of vast areas that will be very productive. The railroads of South America are comparatively few and the mileage relatively small, and the waterways have been for centuries the only practical means of travel, aside from the horse and cart paths that are, of course, not practical for the use of machines unless widened and at least made smooth.

The conditions have been such that motor trucks and wagons could not be utilized to advantage, despite their evident speed and capacity, and with realization that good roads were absolutely necessary for the countries to make progress, a great deal of attention has been directed within last few months toward such improvements as will afford the largest measure of immediate or quick benefit. What road has been constructed has been planned with the intention of increasing the mileage as the resources for construction are available, and to place the most productive sections within reach of the principal markets.

The belief is that railroads will not better serve the needs of the people than will road construction, and instead of making investment for the profit of corporations, there has been a strong sentiment in favor of public improvements which will benefit all the people. To be sure the improvements of highways that will be started are small, merely drops in the bucket, as compared with the needs of a continent, but the road development sentiment prevails in practically all the nations and there is no question that it will have re-

sults proportionate to the economic needs and the progressiveness of the people using the highways.

Development of Venezuelan Roads.

In Venezuela several new districts have been opened which will be of great benefit to the planters in reaching markets. A new 50-mile roadway has been built from Maracay, an inland city, to Ocumare de la Costa, a seaport 16 miles from Puerto Cabello. This new road opens an entirely new section of Venezuela and, according to Herbert R. Wright, American consul at Puerto Cabello, will be of great advantage to those desiring to send products to the markets. Another roadway has just been completed from the seaport of La Vela to Cumarebo.

At the present time a new highway is being constructed from Valencia to Barinas through the towns of Tocuyito, Tinoco, San Carlos, Acarigua, Barquismeto, Ospino and Guanare, a distance of 228 miles, which will also be a direct avenue for motor vehicle transportation. The old roadway between San Felipe and Puerto Cabello, a distance of 186 miles, is being put into condition so that it will serve for automo-



bile or motor truck travel. Even streets of the city of Puerto Cabello are being rebuilt or repaired for automobile traffic. The material used is blue mud mixed with coral taken from the bottom of the sea. This becomes very hard when exposed to the air and makes a firm, smooth road.

Government Highways in Uruguay.

In Uruguay an era of improved country roads has been entered upon, due to the introduction of automobiles and commercial vehicles; the total of the two classes is now about 1000. In dry seasons automobile travel throughout Uruguay is extremely pleasant, and the large rivers are crossed by conveniently located ferries, the smaller streams being forded. The country roads are exceptionally broad, but are badly washed after the rains. In wet seasons the small streams become impassable, sometimes causing travellers vexatious delays of weeks. While provision is made for crossing many of the streams, there still re-

main hundreds of places requiring bridges and culverts.

To improve these conditions a good roads congress is to be convened, which will be composed of delegates from each of the civil departments, at which means of travel to and from the interior are to be studied and practical plans for betterment adopted.

One proposal is to improve the main roads of Uruguay

with macadam, the branch roads being placed in good repair by piking, ditching and scraping. Bridges and culverts will be constructed wherever required. A national system of good roads is to be inaugurated, and the roads will be permanently kept in repair. This plan has received the indorsement of the government and financial assistance has been promised.

What is of especial interest to the American manufacturer is the fact that a great many additional road making machines will be required. There are now in operation, according to Frederic W. Goding, American consul at Montevideo, Uruguay, a number of such machines in use, but many more will be needed in the construction and maintenance work.

Chilian and Colombian Highways.

In Chile the government has repaired 415 miles of roads during the past year, and built 58 miles of new highway, at a cost of \$497,668. There are four new bridges under construction which will be completed during the current year, and 31 others under consideration at a total cost of \$163,175. For 1915 it is proposed to appropriate \$365,000 additional for bridges. At the present moment there are 823 bridges in Chile, costing \$5,657,500.

The recent congress in Colombia provided appropriations for numerous automobile and wagon roads in that republic. An automobile road, costing \$10,000, is being made from Santa Marta into the Santa Marta coffee district, in the mountain ranges. In this country alone fully a dozen appropriations have been made for road construction and improvement, and in view of the prevailing sentiment among the people there is reason to believe that there will be a decided demand for both motor wagons and trucks and automobile pleasure cars in this republic.

South American Motor Truck Markets.

Just what this good road building movement in South America will mean to the motor vehicle and allied industries of the United States is apparent when

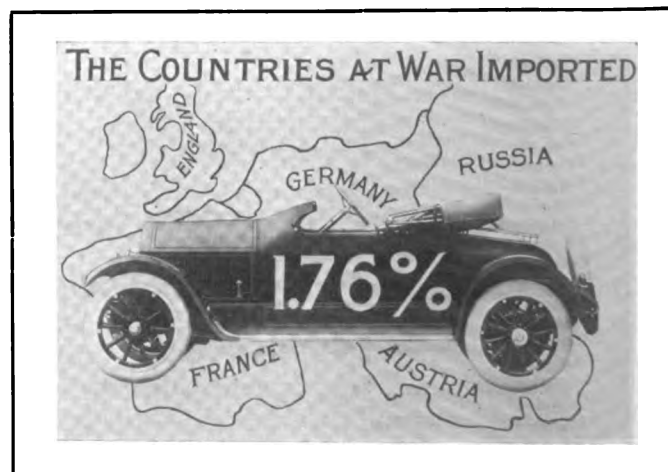
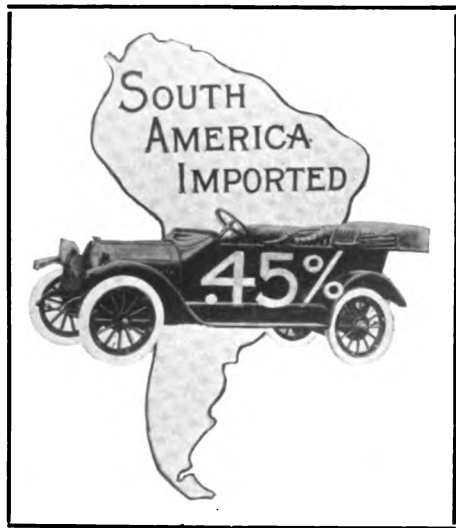
one studies the possibilities. This requires a brief analysis of the conditions. During the governmental fiscal year ending June 30, 1914, motor vehicles valued at approximately \$450,000,000 were produced by the industry, and of this production machines valued at 1.76 per cent. of the total were exported to the European nations now engaged in warfare. From this the loss of the European market, large as it may appear to those who have developed it, will not seriously affect the industry, and this ought to be fully, if not more than, offset by the exports that will be taken by countries that formerly purchased from Europe.

Of this \$450,000,000 worth of automobiles produced in the United States last year, less than one-half of one per cent. were exported to South America. While America was exporting motor cars valued at \$1,939,213 to these Latin-American countries for the year ending June 30 last, Europe exported \$13,168,508. In other words, the United States has lost its grip on European exports valued at \$7,936,506, but has gained a \$13,000,000 selling field in one section alone to compensate it for the loss sustained.

South America is not a stranger to the United States in matter of imports. As a matter of fact, the United States ranked second last year in this respect, having exported \$317,323,294 worth of goods to that country. Great Britain was first with \$322,036,347, Germany third with \$216,010,418, and France fourth with \$103,220,223. So diverting from the automobile figures for a moment, it is seen that, of the total of \$1,304,261,736 of goods imported by South America last year, only \$317,323,294 were imported from the United States. The war cuts off \$699,040,630 of imports direct, and difficult shipping conditions forces South America to look to this country for practically all of her imports for the current year.

This will mean that America will export about \$1,000,000,000 worth of goods to South America this year. Of this amount, approximately \$15,000,000 will be automobile exports, exclusive of tires, parts, etc.

The United States would not have been able to



make much of an impression in South America if it were not for the European war. For the 12 months ending June 30, 1913, this country exported 2820 auto-

mobiles to South America, valued at \$3,165,205. This dropped to 1985 cars exported for the 12 months ending June 30 last, valued at \$1,939,212. While no clear

SOUTH AMERICA'S \$2,870,188,575 COMMERCE FOR 1913.

	Imports.	Exports
United States	\$317,323,294	\$504,378,212
Great Britain	322,036,347	316,419,914
Germany	216,010,418	192,394,702
France	103,220,223	120,907,415
Italy	55,494,413	27,964,001
Belgium	48,747,164	62,557,566
Austria-Hungary	9,026,478	23,294,991
Netherlands	8,293,859	43,277,631
Switzerland	6,189,050	247,722,380
All other countries.....	217,290,517	
Total.....	\$1,304,261,763	\$1,565,916,812

explanation is offered for this decrease, yet it might be said that Europe "tightened up".

South America did not recognize the United States in a financial way, and the United States was more or less indifferent to the Latin countries south of its Panama canal. All clearings were made through London, and rubber shipments from Brazil came to this country by way of London. However, this has now been eliminated, and South America has appealed to this country to establish direct steamship communication. This is now being accomplished, and Brazil has turned a large number of her ships into the American service. Direct credits between the two countries must be established at the same time the shipping service is inaugurated, or there will be further complications.

This phase of the work is being handled more rapidly than the shipping end of it. Various American banks are establishing branches in South America, which will permit credits to be handled direct with this section. The American Express Company and the New York Central Railroad Company have sent special representatives to study conditions with a view of improving transportation facilities in South America. American manufacturers are invited to take advantage of the services of these representatives, and any work within reason will be done by them gratis and reports furnished. Such requests should be made to the American Express Company, 65 Broadway, New York City, care of the South American department.

Naturally South America is also making a stren-

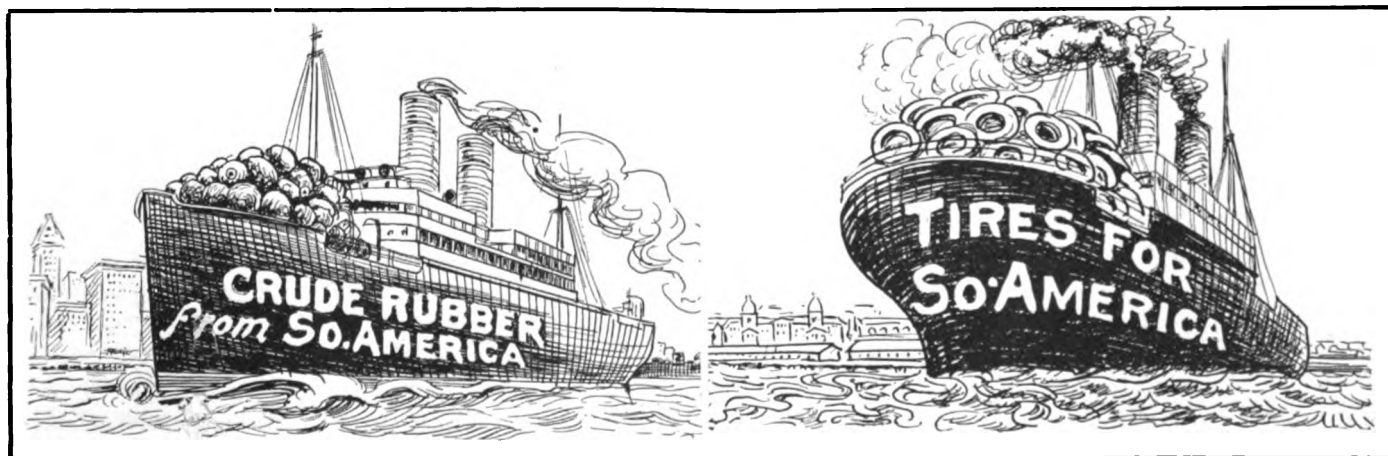
uous effort to export its goods to this country. The total foreign commerce of South America for 1913 was \$2,870,188,575. As stated above, \$1,304,261,763 were imports and \$1,565,916,812 were exports. America is the largest buyer of South American products, taking over \$500,000,000 worth of goods for the past year; to be exact, \$504,378,212. Great Britain was second with \$316,419,914, Germany third with \$192,394,702, France, \$120,907,415, Belgium, \$62,557,566, Netherlands \$43,277,631, Italy, \$27,964,001, Austria-Hungary, \$23,294,991, and all other countries \$247,722,380.

Obviously, South America is just as anxious to perfect trade and financial arrangements in order to swing its \$3,000,000,000 of commerce to this country as America is to have her. The great difference between the products of the two sections is that the United States will import raw materials from South America, but will export manufactured articles to it.

America will buy the crude rubber from Brazil and will sell back the same rubber in the form of automobile tires. This will mean a great deal more to the American manufacturer than it will to South America. Brazil furnishes approximately 40 per cent. of the supply of rubber, but heretofore all of this rubber has been brought to this country by foreign vessels, through foreign ports.

Experts, who have analyzed the situation, state that the only reason the European products, especially the European automobiles, were popular in South America, was because of the excellent shipping facilities. The campaign of the American automobile manufacturers could not be as aggressive as that of the foreign makers, and the securing of parts for the American car was naturally more difficult than for the foreign makes. The South American, like everyone else, wants a good, cheap quality car, and it is safe to say that the American manufacturer is the only one who can supply such a demand.

While the larger manufacturers were sitting back and resting on their laurels from business gained in this and European countries, a number of independent traders were fleeing the Latin-Americans on American car sales. Cars that sold for \$1000 in this country, fully equipped, were palmed off on the South



Americans for \$2500 to \$3000 without the equipment. The duty is 10 per cent. on American cars, and the cost of shipment is not extremely heavy. In 1912 the total imports of automobiles in Argentina were 4281 cars. Of this number, 1651 were imported from France, 708 from the United States, 627 from Germany, 451 from England, 422 from Italy and 295 from Belgium. However, when the public of Argentina discovered it was paying the same for cheap American cars as was being asked for high-class French, German and British cars, there was a general distrustful feeling created in regard to American cars. But now that the leading manufacturers of the United States are taking a hand, the entire situation will be placed on a businesslike basis, with an idea of securing and permanently maintaining commerce between South America and this country.

John Barrett, director-general of the Pan-American Union, has issued a statement regarding the situation in South America, the facts of which are based on cabled information from 34 different cities in the 20 Latin-American countries. The Pan-American Union is an international organization maintained by the 21 American republics. It is controlled by a governing board, composed of the secretary of state of the United States and the diplomatic representatives in Washington of the other American nations.

In his statement, Mr. Barrett says that the widespread and unprecedented public interest in the Latin-American commercial opportunity, as developed by the European war, is being followed by much misconception, in many circles, of real trade and economic conditions obtaining in certain parts of Latin America. On Aug. 8, immediately after the outbreak of the European war, Mr. Barrett addressed a memorandum to the commercial and financial interests of the United States, urging them to prepare to meet the combined responsibility and opportunity presented in Latin America by the war.

This statement attracted general attention and discussion, but Mr. Barrett says that a new phase of the situation has developed, as indicated from his cable reports. "These advices", says Mr. Barrett, "emphasize that what is needed at this hour in Latin America is not so much a supply of the manufactured products of the United States, although required in considerable quantities, as money, loans and advances, credits on purchases, and markets at reasonable rates for raw products which usually go to Europe.

"If Latin America can sell at a fair figure her accumulating raw products and buy, in turn, through receiving financial help and co-operation in the form of advances and credits from United States exporters, importers and bankers, the situation will be speedily remedied and the commercial interests of the United States and Latin America will truly enter upon a new era of Pan-American commerce and comity.

"The fact that the 20 Latin-American countries last year bought imports and sold exports to the vast total of \$3,000,000,000, of which \$2,000,000,000 were transac-

tions with Europe, proves beyond quibble or doubt that the opportunity is there, but subject to the conditions noted. That the United States already has a good start and is making encouraging progress, is shown by the fact that its exchange of trade with Latin America has grown in the last seven years, or during the present administration of the Pan-American Union, nearly 100 per cent., or from \$450,000,000 to \$850,000,000.

"The European war, while greatly lessening the sources of Latin-American imports and the market for exports, and opening a corresponding greater opportunity to United States exports and imports, has so unavoidably crippled Latin-American financial resources and commercial machinery that it must require several months or a year before conditions can readjust themselves and permit results that many United States business men expect immediately.

"Despite the efforts, not only of the Latin-American embassies, legations and consulates, but of the Pan-American Union, as an international organization, and the United States departments of state and commerce, to state the situation exactly as it exists, countless articles have been appearing in various newspapers and magazines emphasizing an alleged 'golden opportunity' without pointing out its actual and present environments of money tightness and dislocation of international commercial methods. Numerous business men and commercial agents, in consequence, are crowding the steamers bound for Latin America with the expectation that they will find the Latin-Americans awaiting them with outstretched hands filled with gold and ready to buy everything and anything they have to sell. These men will presently return to the United States and unfairly condemn and criticise the markets and peoples of the countries visited.

"A great stream of letters and telegrams from both North and South America are daily pouring into the office of the Pan-American Union, as the international American bureau of information, and they prove the widespread interest in the field and opportunity, but they are invariably answered, not only with the statement of the actual opportunity, but with an admonition that the Latin-American market, while vastly potential, is at this moment embarrassed by a serious financial stringency and dislocation of commercial conditions for which it is not in itself to blame.

"The opportunity of the hour, therefore, in a word, is not so much for immediate large sales of the United States manufactured products as one for co-operation and mutual help, together with careful investigation of commercial conditions and preparation to meet future competition successfully."

Thomas Burton, formerly assistant to the manager of the eastern district of the United States Tire Company, New York, N. Y., has been appointed manager of the Atlanta, Ga., branch. From this office Mr. Burton will also direct the operations of the four other branches in the South.

ECONOMY OF LONG DISTANCE TRUCK HAULAGE.

THE increase of railroad freight and express rates, which became effective in a large number of instances during the present year, seemingly creates greater opportunity than ever before existed for the successful operation of motor truck freight lines between points up to 60 miles apart. That such freightage is practical cannot be denied, for the experience of men who have established such service and developed business against the strongest kind of competition that could be conceived by the corporations demonstrates this beyond any question.

In some instances companies that formerly sent packages by train have turned to the trucks and found that while the expense was not materially reduced, for long runs with machines are undoubtedly more expensive, and large loads must be carried to insure a satisfactory profit, they were able to economize very largely with the time of men and vehicles, both collecting and distributing, and could make later collections and begin distribution from two to three hours earlier, these being factors that impelled patronage.

The fact that service of this kind is direct from point to point, that handling is minimized, that the freight yard and express house congestion can be avoided, and that the interests of the customers can be conserved, are indeed worthy of consideration, both from the viewpoint of the distributor and of the business man who depends to a large degree for patronage upon the accommodation he can give. This is especially true of those who are located in comparatively small towns and cities, who depend upon specially purchasing to meet the requirements of their trade, and who necessarily have frequent and small orders.

There is no doubt that through freights of large packages that would be carried at minimum rates would be the least productive, but there is every reason to believe that the proportion of small parcels that could be transported would increase in ratio to the service, and distribution and collection could be made with smaller and less expensive vehicles, provided, of course, that there was sufficient business to justify their use. In the larger cities there are receiving stations centrally located where parcels are collected for different express and freight services, and headquarters of this kind are more or less known. Traffic arrangements with different carriers that would insure local collection are in every way practical, and delivery might be made the same way. In fact there is no reason why freightage and expressage cannot be carried on with trucks in combination with local companies that will do both collecting and distributing of the small packages, thus eliminating the duplication of service and impelling the co-operation of the local companies, for they would have a distinct interest in developing the business.

Where the truck services were installed it would be desirable to operate the largest vehicles that could

be utilized, for experience has demonstrated that there is a greater earning power for the large machine as compared with the small, as the difference in operating expenses is relatively small. By this is meant that the cost of using a six-ton truck is comparatively smaller when capacity loads are considered, and contrasted with a three-ton truck, and the former can earn twice as much as the latter. Not only this, the large machine can haul special loads that would be impossible for the small, and this is a matter of considerable importance when meeting the demands of all classes is considered.

While it is true that the parcel post service of the postoffice department has been very largely used, and there is an advantage in the fact that the goods are hauled by the mail trains, the fact remains that this form of transportation may be changed because of the present cost of shipping in this manner, and there is no prospect of this diminishing the demand of the people for careful and expeditious distribution. Direct haulage between points is the most economical of all. Parcel post packages must be taken from any place of business to the postoffice, and parcel mails are not made up as frequently as are others, so that there is not the same expedition between points as with first-class mail.

Because of obvious conditions long hauls can be made at night, a single truck making 100 or more miles daily, and this would give to any commercial centre as late collection as could be desired, while the purchasers could have their goods as early in the morning as they could receive them. With roads comparatively free from traffic good time is practical, and different points could be served because of the night haulage without lessening the efficiency of the service.

The men who have established public service of the character referred to are meeting with sufficient encouragement to justify expansion, and as there is every reason to believe that the public will desire to obtain transportation as cheaply as is possible, the people will undoubtedly patronize what will meet their demands. If business can be created and developed with lower railroad and express rates, it is indeed practical to believe that it can be attracted and retained under the considerations that will obtain with the increases that have been announced. The railroads have got to make more money to exist, and they expect the people to pay what is to be charged. The corporations, however, cannot control the highway haulage, and just in the measure that the people encourage this method of transportation the more independent they will be, but no matter to what degree they support projects that will benefit them the railroads will dictate the prices for passenger traffic and for carrying freight of large bulk.

In this connection the public ought to give careful attention to all legislation that will retard the develop-

ment of road transportation. Every measure proposed should be carefully analyzed and so far as possible its effects determined, for restriction of the use of vehicles, unless for an extremely satisfactory reason, is certain to react upon the public, and once a law is enacted its provisions may be enforced to the decided disadvantage of the people, and the possible loss of business or privileges.

WALPOLE TIRE COMPANY'S EARNINGS.

The Walpole Tire & Rubber Company, Boston, Mass., earned \$30,000 in August and, according to the receivers, there was no less than \$20,000 earned for any month since the receivers took charge. In six months \$160,000 has been paid to creditors.

At a recent meeting of creditors, which was attended by 60 persons, Judge Harris, one of the receivers, stated that there are about 800 stockholders, of whom 241 are women. Auditor Keith stated that from Jan. 31 to June 30 of this year the company earned \$125,000, and that save one, all departments were now on a good paying basis. The item of good will has been cut from \$800,000 to \$250,000. The sum of \$422,000 has been paid out since the receivership, and the indebtedness of \$1,100,000 has been reduced to \$250,000. The company's quick assets approximate \$750,000 at the present time.

WINTER PROGRAMME FOR S. A. E.

The schedule and programme of meetings of the Metropolitan section of the Society of Automobile Engineers for the winter season is as follows:

- Oct. 29—Report of Research Committee on Electric Transmissions. David Beecroft, chairman.
- Nov. 24—Report of Research Committee on Engine Characteristics. Robert McA. Lloyd, chairman.
- Supplementary subject: Eight-Cylinder Motors. (Date advanced to Tuesday on account of holiday.)
- Dec. 29—Report of Research Committee on Engine Governors. A. J. Slade, chairman.
- Supplementary subject: Magneto versus Dynamo Ignition.
- Jan. 28—Report of Research Committee on Greases. H. M. Martin, chairman.
- Supplementary subject: Asphalt versus Paraffin Base Lubricants.
- Feb. 25—Report of Research Committee on Kerosene Carburetors. A. B. Browne, chairman.
- Report of Research Committee on Non-Electric Continuous Torque Transmission. L. M. Dietrich, chairman.

The Batavia Rubber Company, Batavia, N. Y., has declared a quarterly dividend of $1\frac{1}{2}$ per cent. on the preferred stock, and one per cent. and an extra $\frac{3}{4}$ per cent. on the common, which was payable Oct. 1.

The contested claims of \$50,000 in the case of the bankrupt Michigan Buggy Company, Kalamazoo, Mich., have been stricken out by the referee.

The Bower Roller Bearing Company, Detroit, Mich., has declared its semi-annual dividend of five cent.

NEW YORK TERCENTENARY PRIZES.

Prizes have been announced for the best decorated automobiles in the motor pageant to be held in connection with the New York City tercentenary celebration on the evening of Oct. 28. The prizes total \$5000 and will be awarded in various divisions.

The bulk of the prizes will be awarded to division C, which will take in the pleasure cars; \$1975 will be used here. This division will include decorated touring cars, runabouts, club section and makes of cars entered by owners or dealers and formed into groups. This will include gasoline cars and electrics. Division D, commercial cars, will receive prizes valued at not less than \$1525. Division B, grotesque and burlesque cars, will receive prizes of at least \$375. Other prizes of the same amount or smaller sums will be awarded to the advertising section, motorcycles, early models, etc.

MOTOR CAR EXPORTS FOR AUGUST.

For the month of August 66 commercial cars were exported, valued at \$124,016, compared with 68 exported for August, 1913, valued at \$109,437. For the eight months ending August last the export of commercial cars totalled 509, valued at \$772,257. This is a loss when compared with 730 machines exported for the corresponding period of the previous year, the value of which were \$1,260,086.

Pleasure car exports were: For August, 1914, 451, valued at \$565,895; August, 1913, 2004, valued at \$1,983,749. For the eight months this year the exports were 19,393, valued at \$17,384,317, against 19,194 and 16,816 for the same eight months of 1913 and 1912, valued at \$19,744,482 and \$16,813,771 respectively.

STUDEBAKER BUYING COTTON.

The Studebaker Corporation, Detroit, Mich., has instructed its branch managers in Atlanta, Ga., Dallas, Tex., and St. Louis, Mo., to purchase 500 bales of cotton at 10 cents a pound. This is to be purchased from growers only, and if sold for more than the purchase price the difference will be paid to the growers from whom the cotton was bought.

The Swinehart Tire & Rubber Company, Akron, O., has declared a six per cent. dividend on its capital stock, and after meeting all charges, dividend requirements, depreciations, etc., has a surplus of \$137,000. At the present time the plant is working at 80 per cent. of its capacity.

The Westinghouse Electric Company, Pittsburg, Penn., has declared a dividend of $1\frac{3}{4}$ per cent. on its preferred stock and one per cent. on the common stock, payable Oct. 15 and 30, respectively.

NEW GMC MODEL 15 1500-POUND TRUCK.

BEGINNING Nov. 15, the General Motors Truck Company, Pontiac, Mich., will begin delivery of a new 1500-pound gasoline motor wagon, which will be known as model 15. This machine has been developed for two years and it will be added to the standardized productions of this concern, which will then be gasoline vehicles of 1500, 2500, 4000, 7000 (two types) and 10,000 (two types) pounds capacity, and electric trucks of 1000, 2000, 3000, 4000, 6000, 8000, 10,000 and 12,000 pounds capacity. This model is regarded as completing the production, in that the company will have a size that will serve for practically every normal transportation requirement.

This model is a four-cylinder, shaft driven type, designed for fast delivery and light loads, it having speed of 20 miles an hour. The machine has been simplified and made extremely accessible, and the best of engineering experience is represented in the construction. Because of the light load and the speed pneumatic tires are used and the rear springs are full elliptic, so as to have the fullest protection of the mechanism from stresses of road shock.

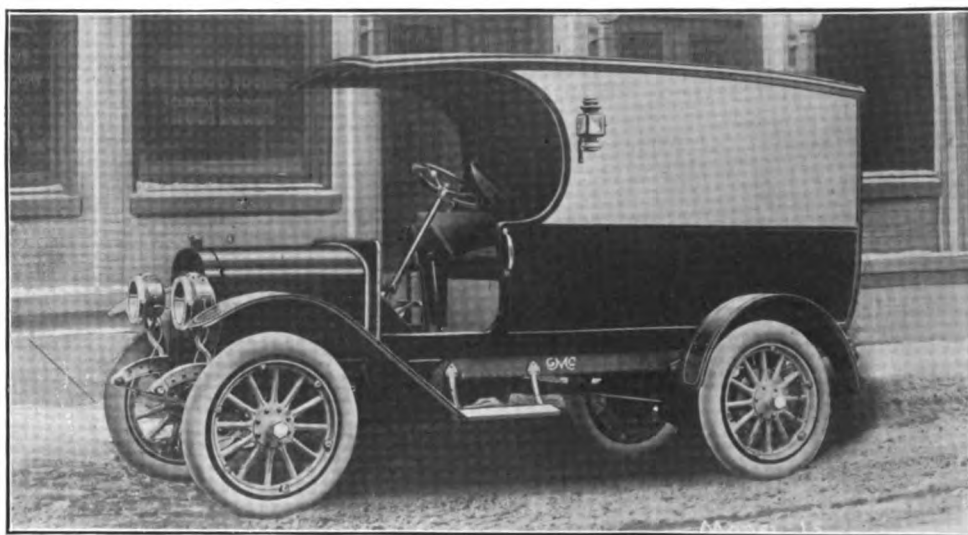
The chassis has wheelbase of 122 inches and tread of 56 inches. The dash is located behind the motor and the loading space of an express body is 98 inches length and 45 inches width. With the driver's seat and the usual equipment the chassis weighs 2360 pounds, and with a body weighing 750 pounds the capacity is 1500 pounds.

The motor is a four-cylinder, vertical, water cooled, L. head type, with cylinder bore of $3\frac{1}{2}$ inches and stroke of five inches. The horsepower rating by the S. A. E. formula is 19.6, but the motor will conservatively develop 25 horsepower. The cylinders are cast en bloc, with ample water jackets to insure efficient circulation and cooling, and of a high-grade of gray iron. The pistons are of the same material, are $3\frac{3}{4}$ inches length, and they are fitted with three oil rings. The engine case is a barrel type, with an oil reservoir in the base of the lower section.

The crankshaft is a nickel steel drop forging, heat treated, of large diameter, and the camshaft is forged with the cams integral. The camshaft is hardened. Both crankshaft and camshaft are carefully ground. The connecting rods are steel drop forgings and are heat treated. The wristpins are hardened and ground to size. The main and the connecting rod big end bearings are babbitt, mounted in bronze journals, and the small ends of the connecting rods are fitted with

bronze bushings. The valves are $1\frac{11}{16}$ inches diameter. The valve operating mechanism is fully enclosed by cover plates. The timing gears are helical cut and are said to be practically noiseless. The motor is cooled by a circulation of water through a large tubular radiator that is forced by a shaft driven centrifugal pump, radiation being insured by a belt driven fan that is mounted on a ball bearing adjustable bracket.

The motor is lubricated by a combination force feed constant level splash system. On the camshaft is an eccentric which drives a plunger pump that floods the timing gears, and the oil drains to the constant level pans beneath the connecting rod big ends, the sweep of the ends lubricating the connecting rod, wristpin, crankshaft and camshaft bearings, the valve tappets, the pistons and the cylinder walls. An indicator on the crank case shows the volume of oil in the reservoir. The carburetor is an automatic float feed type with a double jet, with a throttle that is oper-

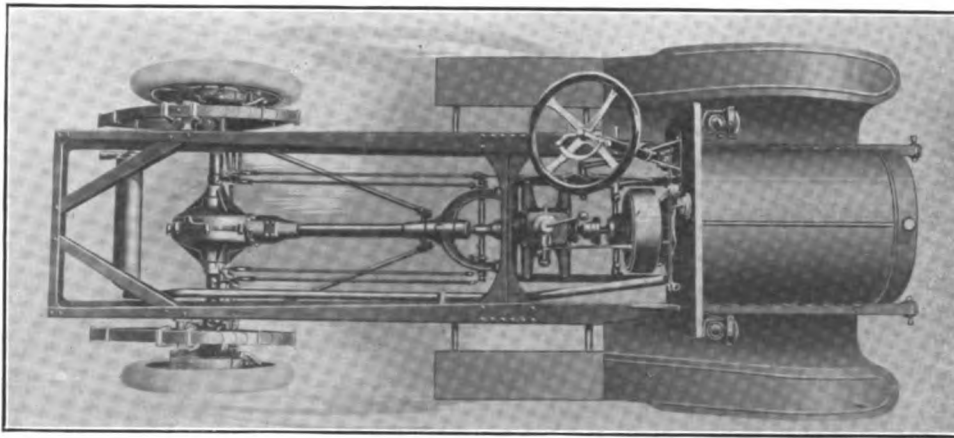


Model 15 Shaft Driven GMC Delivery Wagon, 1500 Pounds Capacity, Fitted with Special Panel Body.

ated either by hand lever on the steering column or foot accelerator. The ignition is by a high-tension magneto. The motor is fitted with a governor that is automatic in its operation. It is fully enclosed and may be secured with a Yale lock to prevent tampering with it. With this the machine is usually restricted to 20 miles an hour.

The clutch is a leather faced cone, with springs beneath the facing to insure easy engagement. The clutch shaft is coupled to the main shaft of the sliding gear type of selective gearset, which has three forward and reverse ratios, that affords direct drive on the high speed. All the gears are heat treated nickel steel and the shafts are heat treated high carbon steel, which are carried on ball bearings. The motor, clutch and gearset are installed in a sub-frame that is suspended on three points to protect the power plant against the stresses of chassis distortion.

The drive is by shaft of heat treated high carbon



Plan View of the Model 15 GMC Chassis, Showing the Simplicity and Accessibility of the Mechanism.

steel with two universal joints between the gearset and the driving pinion. It is enclosed in a seamless steel tube that is fitted with a large yoke at the forward end that is pivoted by horizontal pins at the centre cross member of the frame. The rear end is bolted to the differential housing of the three-quarters floating rear axle. The differential is a bevel gear type. The driving thrust is taken by radius rods from the rear axle to the yoke of the torque tube.

The frame is a pressed open hearth steel channel section with three cross members with heavy gusset plates and braces. It is carried on semi-elliptic forward springs, $36\frac{1}{2}$ inches length and two inches width, and full-elliptic rear springs, 40 inches length and two inches width. The rear springs are fitted to swivelled hangers on the frame that insure compensation for all loading and driving stresses. The spring eyes and the swivelled hangers are fitted with ample grease cups to insure adequate lubrication. The front axle is an I section $1\frac{3}{4}$ by $2\frac{3}{8}$ inches, and the three-quarters floating rear axle is enclosed in a steel housing to which is bolted the torque tube. This housing carries the brake flanges and the shafts of the brake linkage. The wheels are wood, artillery type, with cup and cone ball bearings forward and Hyatt roller bearings in the rear. These wheels are fitted with 35 by five-inch demountable pneumatic tires, that conform to S. A. E. dimensions.

The steering gear is a screw and nut irreversible type with large-surfaced bronze and steel wearing parts, all fully enclosed and well lubricated, with means for adjustment to compensate for wear. The connections are fitted with springs to compensate for road shock. A 17-inch hand wheel makes for easy control. The drive is left side and the control is by the conventional clutch and service brake pedals, with the gear shifting

and emergency brake levers at the centre, at the right of the driver. The service brake bands contract on drums on the rear wheels, and the emergency brake shoes expand within the same drums. The brakes are of large surface area and are stated to be very efficient. The gasoline tank is 13 gallons capacity and is placed beneath the driver's seat.

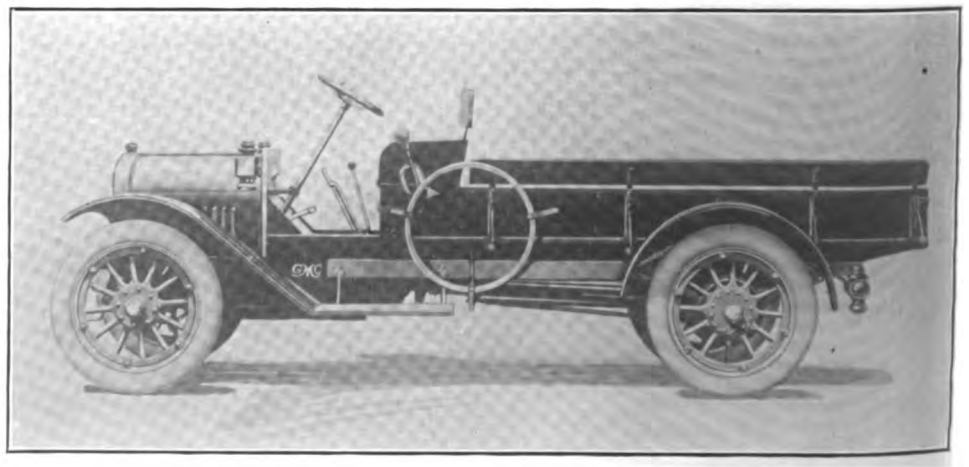
These chassis are sold with the usual equipment, but the bodies will be

built to standards established by the company for flareboard, flareboard with canopy top, flareboard with canopy top and screen sides or four-post canopy types, or with any design that may be specified by the purchaser. With the standard types for model 15 chassis the loading space back of the driver's seat is 96 by 45 inches, with overall body length of $100\frac{1}{2}$ inches and width 57 inches. All these bodies rest on the chassis frame between the rear wheels.

OPENINGS FOR FOREIGN TRADE.

Cablegrams to the Department of Commerce from the various United States consuls show that there is a large field for American manufacturers abroad. The American consul at Stockholm, Sweden, reports that that country is a probable market for motor machines, automobiles, motorcycles, etc., and from Port Elizabeth, South Africa, the report comes that there is a prospect for a market for motor vehicles.

From the consul at Cape Town, South Africa, is a report of a prospective market for motor cars, etc., and from Trinidad, British West Indies, comes a similar message. Automobile tires and supplies will have a large field in Portugal, according to the report which has been forwarded by the American consul at Lisbon.



Model 15 GMC Chassis Fitted with the Standard Flareboard Express Body.

TRICAR FIRE APPARATUS.

The tricar construction, so well developed and so much utilized in England and some parts of Europe, has been developed for fire department apparatus by the Davis Sewing Machine Company, Dayton, O., which will shortly place in the market several types adapted for differing requirements.

The tricar has two forward wheels with an axle with conventional steering knuckles, carrying a "head" to which is coupled the frame, power plant and rear wheel of a motorcycle. The machine is steered by handle bars, such as are used for bicycles and motorcycles, with linkage, or by a hand wheel, the bars affording the quicker control.

The Davis tricar is built with wire wheels. The front axle carries a platform on which are placed hose, a 35-gallon extinguisher, lanterns, axes, tools, a 12-foot ladder and clothing. The rear section of the machine has a two-cylinder, nine-horsepower motor, with a two-speed gear, and it has two seats arranged tandem. The tricars, fully loaded and carrying two men, have been driven more than 45 miles an hour, and can be driven faster in good conditions.

The tricar is designed to serve as auxiliary to city fire departments, to make runs to considerable distances, depending on superior speed to make quick response and suppress or check fires pending the arrival of slower apparatus, and for use in village departments where large mileage is necessary on account of the buildings being scattered over a considerable area.

WANTS ARMORED TRUCKS FOR ARMY.

Congressman Anthony of Kansas, member of the House committee on military affairs, is about to introduce a bill calling for the purchase of armored trucks for the United States army. Members of the committee are said to be much impressed by the efficiency of the armored trucks in the European war, and state that this government can no longer afford to be without such equipment.

WILL MAKE SMALL TRUCKS.

A new concern to enter the truck business is the Beardsley Electric Company, which it is stated will build trucks of half-ton and one-ton capacity.

Robert Seymour has been appointed manager of the Worcester branch of the White Company, where he will handle this make of cars and trucks under the direction of the New England branch at Boston, Mass.

The 5000-pound combination police patrol and hose car ordered for Mt. Vernon, O., has been delivered by the Peerless Motor Car Company, Cleveland, O.

FOREIGN TRADE MUST GROW.

Palmer-Moore Advertising Manager Looks for Large Demand for Trucks.

That American manufacturers will experience a big boom in their export trade as a result of the European war, though they will have to meet European demands rather than forcing American products upon unwilling buyers, is the opinion of Robert M. Barker, advertising manager of the Palmer-Moore Motor Truck Company, Syracuse, N. Y., and he believes that when shipping facilities have been improved the demand will be large. He is sanguine that a considerable proportion of the exports will be motor trucks.

Mr. Barker thinks that if the statements of purchases of freight machines for European governments are true, that these will be, from the conditions, necessarily cash transactions, for no concern would be inclined to give credits or take risks. The shortage of shipping and the responsibility of making deliveries abroad he regards as deterrents to business of this character unless the orders are made conditionally cash upon delivery at shipping ports.

The prospects for business with neutral countries, however, he believes to be especially attractive, there being every reason for expectation of development of trade with South American nations. Most of the neutral states of South America have bought trucks of Europe, and while shipping is not adequate, the United States will gain steadily if the manufacturers will begin at once to stimulate transactions with campaigns of education. Results, of course, will not be immediately realized.

Much of the business done by these nations has been financed by the banks of the nations now at war, and readjustment of the trade will require time. The possibilities for financing business with these countries through New York banks are constantly improving, but one great handicap is the credit system the vogue there, and the credits for long periods. American manufacturers have not developed trade as carefully as have the foreign business men, and have not studied the trade to meet its requirements. Not only this, the packing has been poorly done in many instances. Mr. Barker looks for a national business boom, and believes that while there will be a loss of the European cotton market to the South, this will be in part offset by the increased American demand in anticipation of foreign markets requiring finished goods.

An industrial survey shows that there are six automobile manufacturing plants in Minneapolis, Minn., 88 distinct motor car repair shops, 11 distinct accessory manufacturers and 24 gasoline filling stations. These employ 1437 persons.

MOTOR CARS IN NEW GREECE.

Recent War Experience Demonstrated the Value of Trucks to Nation.

According to John E. Kehl, American consul, Saloniki, Greece, there are from between 50 to 60 motor cars and trucks owned by the Hellenic government, and three cars are in private possession. It is stated that these were of considerable service to the Greek army during the recent military campaigns in Macedonia, where there is a dearth of railways.

The government now maintains an automobile corps and repair shop in Saloniki and in Janina, Epirus; and it is stated that it is so well satisfied with the results attained by the automobile service of the army during recent military operations that it has decided to equip a complete battalion of expert chauffeurs with 400 lorries. The minister of war at Athens is the competent authority in all matters relating to army supplies. The motor lorries at present employed in the army service are of about two-ton capacity and can make about 40 kilometers an hour.

Motor cars are being used by the Hellenic regime for carrying mails and for military traffic between Saloniki and several points in the interior. A regular automobile service (private undertaking), employing American cars, is maintained between Cavalla and Drama in the tobacco growing districts. Several other private lines are in operation in other parts of Macedonia.

There is but one automobile to be had for public hire in Saloniki. The cars in government service are the Fiat, Benz, Renault, Itala, Ford and Piccard-Pictet. The Fiat has so far been given the preference by the Hellenic government for army purposes. Fore tires are plain and rear tires studded. The driving custom is to turn to the right.

The roads are rough and have steep gradings. None of the highways are of modern construction and the streets of the city are poorly paved and in bad condition. It is reported, however, that the Hellenic government will take steps to improve the condition of the roadways in the interior of the occupied territory. Owing to this unsatisfactory state of the roads of the surrounding country and the rolling topography of Macedonia, it is essential that motor vehicles for this market be durable and not of too light weight, and so far as cars for pleasure purposes are concerned, cheapness is a requisite. For the latter reason American manufacturers should be in a position to compete against European firms in this district, inasmuch as American cars are as a rule of a lower price and of durable construction.

The unsatisfactory commercial condition of Macedonia, together with the exceedingly poor roads, limits the attractiveness of this market as regards cars for pleasure purposes. Under present circumstances only such vehicles as would have a commercial use would

find a demand, for business is in such a depressed state that the sale of any articles save those of actual necessity will be found difficult.

With few exceptions the retail business of Saloniki is conducted on a small scale. There are hundreds of small shops or stores, but only a very few—not more than 10—where delivery wagons or vans could be used to advantage. As to wholesale houses, they claim to find it cheaper to hire than to maintain wagons. City deliveries are effected by errand boys, hamals (registered porters who quite frequently carry several hundred pounds on their backs), and by hired teams at a very small expense.

The best system of introducing goods of this class would be by sending large photographic prints for the use of agents, and catalogues published in the French language for general distribution. Terms of sale constitute an important factor. Until the present, European houses have been inclined to grant very liberal credit, but owing to the present business depression terms are now more stringent. Cash against documents, or part cash with order and balance against documents, are the customary arrangements at present. Saloniki merchants prefer c. i. f. quotations. Merchandise shipped from the United States to Saloniki is subject to one and sometimes three trans-shipments before reaching this port. Too much care cannot be exerted in packing, as freight is subject to very rough handling before reaching Saloniki.

A list of the leading firms in Saloniki likely to be interested in the import of motor vehicles is forwarded and may be had from the bureau of foreign and domestic commerce and its branches.

TRUCK DEVELOPMENT IN INDIA.

Horse and bullock carts used to transport the mail in Bombay and Colombo have been replaced by motor vans. There seems to be excellent reason to believe that India may become one of the largest users of motor vehicles in the world.

E. W. Weaver, formerly of the Peerless Motor Car Company, Cleveland, O., and Gray & Davis, Boston, Mass., is now chief draftsman for the Ferro Foundry & Machine Company, Cleveland, O.

R. W. Bush has succeeded Mr. Giltner as sales manager of the Velie Motor Vehicle Company, Moline, Ill. Mr. Bush was formerly with the Kurzman Plow Company, Peoria, Ill.

Joseph J. Martin, recently with the Commerce Motor Truck Company, has been appointed western sales manager of the Signal Motor Truck Company, Detroit, Mich.

N. F. Sutton, of the General Motors Truck Company, New York, N. Y., has been appointed manager of the St. Louis, Mo., branch of that company.

NO WAR REVENUE TAX ON AUTOMOBILES OR FUEL.

THE Democratic caucus of the United States Senate has voted to eliminate the proposed war revenue tax on motor cars and gasoline. In its final amended shape the proposed tax was for one cent a gallon on gasoline, instead of two, and 50 cents a horsepower on automobile sales. This had been approved and passed by the United States house finance committee, but the storm of protest from automobiles and truck manufacturers, and the various associations throughout the country caused its early death. The measure was termed unfair taxation by nearly every interest in the United States, both in and out of the motor vehicle industry.

In place of the tax on gasoline and car sales, the American Automobile Association is urging the introduction of a bill in every state calling for a tax on all users of the highways. The national association and the state associations will combine to urge the passage of these bills, which will provide for a wheel tax on horse drawn vehicles. It is pointed out that the automobile registration tax has been justified by the authorities on the ground that automobiles wear out the roads rapidly and, therefore, their owners should help to pay for building and maintenance. In support of the wheel tax bills, motorists contend that horses do more damage to modern roads than do automobiles.

However, the present indications are that an increased tax on beer and a tax of five cents a gallon on rectified spirits will offset the loss on the car and gasoline taxes. It is expected that a long fight on the war revenue measure will prolong the session of congress.

The motor car manufacturers, through Senator William Alden Smith of Michigan, hurled a mighty broadside against the Senate proposition in form of telegraphic dispatches. During the course of his speech, Senator Smith read lengthy telegrams from Nordyke & Marmon Manufacturing Company, C. W. Nash, president of the Buick Motor Company; Hupp Motor Car Company, Chalmers Motor Company, Studebaker Corporation, Cadillac Motor Car Company, Federal Motor Truck Company, Henry B. Joy, president of the Packard Motor Car Company; Imperial Automobile Company, etc.

In addition to telegrams received, Senators Smith and Townsend received protests from these concerns: Stutz Motor Car Company, Briscoe Motor Company, Jackson Automobile Company, Abbott Motor Company, Anderson Electric Car Company, Briggs-Detroit Company, Commerce Motor Car Company, Cricket Cyclecar Company, Day Automobile Company, Dodge Brothers, Ford Motor Company, Hudson Motor Car Company, Krit Motor Car Company, Regal Motor Car Company, Saxon Motor Car Company, Signal Motor Truck Company, Wagenhals Motor Company, Wahl Motor Company, Republic Motor Truck Company, Cartecar Company, Durant-Dort Carriage Company,

General Motors Truck Company, Havers Motor Car Company, National Motor Truck Company, Oakland Motor Car Company, Olds Motor Works and Reo Motor Car Company.

The Boston automobile dealers' organizations were prominent in the fight to kill the proposed war revenue tax, and a committee consisting of Joseph S. Donovan, Studebaker agent; John H. Johnson, manager of the Buick branch, and J. W. Maguire, Pierce-Arrow agent, visited Washington to lodge a formal protest. Representatives Mitchell and Gallivan accompanied the committee to the Senate, where it was received by Chairman Simmons of the finance committee. The committee gave the Boston men a hearing, but it had already decided to eliminate the proposed tax on automobiles as far as the Senate was concerned. But the House is yet to be reckoned with.

The Metz Company of Waltham, Mass., sent a telegram to Senators Lodge and Weeks, in which the fact was pointed out that the company's output for the next 12 months will be over 250,000 horsepower, sold mainly to persons of moderate means for economic purposes. Any material tax, the company stated, would paralyze its business.

Another prominent New England organization to object was the Maine Automobile Association. This association, representing 3000 motorists in the State of Maine, pointed out the hardships that would result if the bill was made law. Similar remonstrances were sent by numerous organizations.

OFFICE IN LOS ANGELES.

The Ahlberg Bearing Company, Chicago, Ill., has opened an office and factory in Los Angeles, Cal. Carl A. Ahlberg, president of the company, has taken charge of the company's interests in Los Angeles, and is superintending the installation of the machinery in a new factory there.

NEW HYATT OFFICE BUILDING.

The Hyatt Roller Bearing Company, Detroit, Mich., has purchased a building plot 165 by 161 feet at Grand boulevard and Cass avenue, Detroit, for the erection of its new office building.

The application of the Central Trust Company for an order authorizing the sale of the United States Light & Heating Company, Buffalo, N. Y., has been denied by the federal court. The receivers opposed the motion, stating that the concern would soon be in good financial standing.

The Over-All Roller-Bearing Company, Los Angeles, Cal., has been incorporated with a capital of \$500,000.

GARAGE LAW DEFECTIVE.

Massachusetts Electric Vehicle Men Want Protection of All Interests.

The electric vehicle interests in Boston, Mass., represented by the Electric Vehicle Association and the Electric Motor Car Club, discovered what seemed to them radical defects in the new state law governing garages. As a result, a hearing before J. H. O'Keefe, the newly appointed fire hazard commissioner, for the purpose of recommending that rules and regulations uniform with the other large cities of the country be adopted, was asked for.

These proposed regulations, it was agreed, would make a garage safe from fire hazards as far as electric apparatus and appliances used where gasoline fumes might originate, and at the same time would not impose an undesirable restriction on the manufacture or installation of such apparatus as is necessary for charging electric cars, operating motors or lighting garages.

The hearing was held at the State House, Boston, and the electric interests were headed by Day Baker, president of the Electric Motor Car Club and chairman of the insurance committee of the Electric Vehicle Association of America. The hearing was not a local affair by any means, as representatives of various interstate interests were present. F. A. Barron, representing the insurance department of the General Electric Company, Schenectady, N. Y.; W. E. Russell, C. M. Greene and A. H. Abbott, all of the General Electric Company, and William H. Blood, Jr., representing the Stone & Webster interests; J. A. Hunnewell of the Lowell Electric Light Corporation and chairman of the New England section of the Electric Vehicle Association of America; T. J. Pace of the Westinghouse Electric Company, Pittsburg, Penn.; C. H. Miles of the Boston Edison Company, Boston, Mass.; I. Osgood of the Boston Board of Fire Underwriters, and C. S. Lawler of the Factory Mutual Insurance Company were among the speakers.

These remonstrants stated that so far as had been

learned, no garage fire had ever originated from electric charging apparatus, and that with the proposed improved methods of installation fires would be practically impossible. Mr. Osgood of the Boston Underwriters, who is chairman of committee on electric installation of the National Fire Protection Association, presented a tentative draft of regulations. It was proposed to incorporate this in the national code of the association. This met the approval of the electric interests.

Commissioner O'Keefe expressed himself as highly pleased with the method adopted by the electric interests in presenting this matter, and stated he would carefully weigh all of the arguments and would adopt rules that would protect the community against undue fire hazard, but would not interfere with the proper conduct of business.

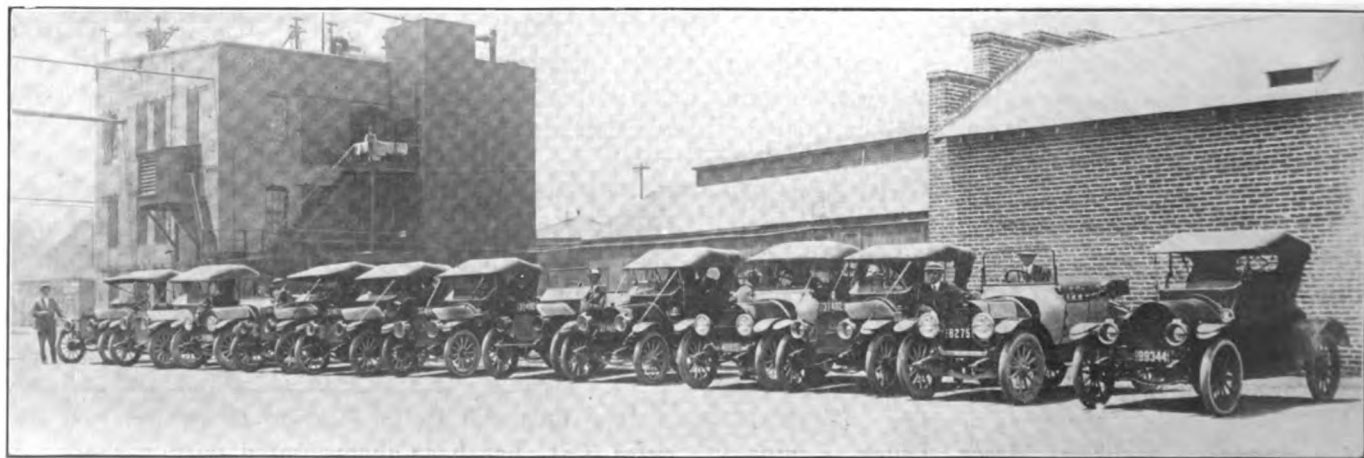
SALE ORDER DENIED BY COURT.

Application for an order authorizing the sale of the United States Light & Heating Company was denied by Judge Hazel in the federal court at Buffalo. The application was made by Alfred Stickney, representing the Central Trust Company of that city. James O. Moore, one of the receivers, and Louis Posner, attorney for the company, opposed the motion, claiming that the company would soon be in good financial standing.

The National Garage Owners' Association has been formed in Chicago. F. E. Christian is president of the garagemen, with G. E. Pfleger secretary and M. I. Iles is president of the supply men, with C. B. O'Hare secretary.

There are now 163,604 automobiles registered in New York state, of which 69,197 are new cars. Last year 134,405 machines were registered in this state, of which 61,094 were new.

The Knox Motors Company, Boston, Mass., has moved its quarters from Boylston street to rooms 825 and 826 of the Tremont building in the same city.



Some of the Fleet of Jackson Cars Used by the Salesmen of the Los Angeles, Cal., Branch of the Cudahy Packing Company.

HOW PROVISIONS ARE BEING SUPPLIED.

The great difficulty in supplying provisions to the various armies, according to a Paris correspondent, is the fact that the constant changing of the regiments makes it almost impossible for the commissariat to locate them. To simplify matters each day a special station is chosen for each army corps and the regimental transport goes every day to the station and receives two days' provisions. If the railway is not available the supplies are provided by motor transport.

In the event that the motor transport is not available the army corps draws on its stocks of provisions, which are good for four days. Herds of cattle are driven some distance in the rear of each army corps and rest before slaughtering. The daily consumption of each army corps is 120 head of cattle, and the meat is carried to the front by Paris motor 'buses.

RUSSIA'S MECHANICAL PLOUGHING.

During the past two years there has been a general tendency in Russia to employ ploughing tractors, driven by petrol engines. However, it is pointed out by a foreign correspondent that these tractors have not always proved to be successful, owing to the high price of petrol and gasoline, and the impossibility of using crude oil as fuel. These tractors have all been British built, and in many instances it has been shown that they have not been strong enough to withstand the rough work required of them.

It would seem that there is, or will be in the near future, a large market in Russia for these machines.

ADMIRALTY'S USE FOR LONDON 'BUSES.

The British admiralty, as well as the war office, has taken over a number of London 'buses, converting some of them into ambulances. These will be used for the conveyance of wounded sailors from the various hospitals established at points on the east coast to inland districts. These 'buses were used in bringing some of the survivors of H. M. S. Amphion from Harwich to Chatham.

Z. C. Elkins has been made manager of the Chicago branch of the General Motors Truck Company, Pontiac, Mich. Mr. Elkins previously represented the company at Pittsburg, Penn.

Harold L. Pope, formerly with the Pope Manufacturing Company, has become associated with the Ferro Machine & Foundry Company, Cleveland, O.

E. C. Sickles has been engaged as works engineer of the Hyatt Roller Bearing Company, Newark, N. J.

Middleton & Sharpe, Rutherford, N. J., will build a plant for the manufacture of rubber tires.

CHEAP RUBBER A CERTAINTY.

Lack of European Consumption and Plantation Crops Will Cause This.

The United States Tire Company, New York, N. Y., has made a reduction in its chain tread casings ranging from four to 15 per cent. This will place the prices even lower than the before-the-war list. The 32x3½ pneumatic tire has been reduced from \$27.40 to \$20.10, and the 36x4½ from \$49.35 to \$42.

Speaking about the present conditions of the crude rubber and tire business, A. A. Templeton, vice president of the United States Tire Company, says that in his opinion rubber will be purchased for 50 cents in the near future. The present price is 58 cents. Twenty-five cent rubber is predicted by Mr. Templeton, but this does not apply to the immediate future; he adds: "The big price reduction will result because rubber is now being cultivated on a very large scale in far eastern countries," says Mr. Templeton. "This is much cheaper than the method of getting rubber from the rubber forests in South America.

"If the plantation returns are as satisfactory as experts who are watching their progress report, there will be a great change in the rubber industry within the next few years. One of the principal reasons why the advance of 12 to 20 per cent. on tires was not maintained, is due to the fact that neither Germany nor France nor other European countries which have imported large quantities of rubber, or rather the raw material, are receiving any, and the other reason is that shipping conditions are such that the raw material is reaching this country in sufficient quantities to allow the selling of tires at the old prices".

Generally speaking, tire prices are the same as before the war. When prices tumbled, following their over-night ascent, United States, Goodrich, Diamond, Republic and Fisk returned to their old dealers' discounts, but held to the higher list. On Oct. 1 the United States returned to its old list, and Goodrich and Goodyear did likewise. On Oct. 2 the Fisk Rubber Company followed suit, but the Republic and a few others are still holding to the higher list, but dealers' prices are normal.

C. W. Nash, president of the General Motors Company, Detroit, Mich., has appointed D. K. Moore sales manager of the Northway Motor Manufacturing Company, Detroit, Mich., and of the Jackson-Church-Wilcox Company, Saginaw, Mich. He was formerly sales manager of the Weston-Mott Company, Flint, Mich.

V. V. Green has been made representative of the Republic Motor Truck Company in Detroit, Mich., and its vicinity. He formerly had charge of the machinery department of the Michigan state fair.

SEEKING NEW LOCATION.

The York Co-Operative Tire & Rubber Company, New Orleans, La., through its president, Leslie Dunn, is seeking a site in Canton, O., for the removal of its plant to that city. Mr. Dunn has asked the Canton Chamber of Commerce for 10 acres of land upon which to erect a tire plant which can turn out 2000 finished tires a day and a cotton factory where tire fabric can be made. He also wants aid in disposing of the remaining stock in the York Company. He has a unique plan in that he would have the company include only motor vehicle owners, each stockholder to be limited in the amount of stock he can own, by the number of tires he uses in a given period.

MOTOR BATTERY RAISED BY CANADIANS.

A machine gun battery has been raised by patriotic citizens of Ottawa, Canada, consisting of 15 armored automobiles, upon which machine guns are mounted. These vehicles, together with reconnoitering motor cars and an ambulance, are being sent to England for active service. The outfit will be accompanied by 150 men, including experienced chauffeurs.

The cars are powerful and are said to have a speed of 50 miles an hour. Experimental firing on the machines with Ross rifles and Lee-Enfield rifles at 25 yards, scarcely made a dent on the armor plate. The chauffeurs and men in the machine are completely protected.

SEEK PROBE ON TRUCK AWARD.

As the result of protests made by several concerns that submitted bids for the Washington postoffice contract, the action of the postmaster-general in awarding the order for the seven motor trucks to the White Company, Cleveland, O., may be the subject of a Senate inquiry. Senator Townsend of Michigan has introduced a resolution to this effect.

TREGO NOW WITH KNOX.

Frank H. Trego, who has been connected with the research engineering department of the Packard Motor Car Company since 1912, became assistant general manager of the Knox Motors Company, Springfield, Mass., on Oct. 1.

C. R. Jones has been appointed district representative of the Lippard-Stewart Motor Car Company, Buffalo, N. Y., with headquarters in Dallas, Texas.

The H. J. Harrold Tool Company, Salem, O., manufacturer of all kinds of tools and automobile springs, will enlarge its plant and build an office.

The Oldfield patent bill has been reported favorably by the House committee on patents.

WANT A FIVE-TON ELECTRIC TRUCK.

G. T. Milne, British trade commissioner for Australia, says that the municipal council of Kalgoorlie is anxious to secure bids for a five-ton electric truck. This is required for the transport of road metal, for street watering purposes and for drawing sanitary carts. The maximum speed is to be six miles per hour.

"Its requirements", says the council board, "will probably be best met by a forecarriage, containing the motors, battery and controller, so arranged that vehicles for the purposes above mentioned can simply be coupled on to it". A copy of the specifications may be secured from the United Kingdom makers of electric trucks, Commercial Intelligence Branch, Board of Trade, 73 Basinghall street, London, N. C. Bids should be sent to the Town Clerk, Municipal Offices, Kalgoorlie, West Australia.

NEW FACTORY AT CLEVELAND.

The Willard Storage Battery Company, Cleveland, O., is pushing forward the construction of its new plant on East 131st street, that city. It is expected that the administration building, which is one of 10 to be built, will be under cover before the snow falls. Ground for this building was broken on Sept. 24. The new plant will contain six acres of floor space, leaving ample land for further extensions. All of the buildings will be of brick and will be equipped with sprinklers throughout. A switch track from the Belt Line railway, which communicates with all railroads in Cleveland, will extend the entire length of the plot in close proximity to the ends of each of the 10 buildings.

COMMANDEER MANCHESTER 'BUSES.

The motor 'buses of the Manchester Corporation, Manchester, England, which have been running between the tram terminus at Palatine road and Northenden and Cheadle, have been commandeered by the English war authorities. The Manchester company will probably revert to the old horse 'buses in order to alleviate the congested traffic conditions.

Governor George Hodges of Kansas maintains that \$4,000,000 is wasted annually in that state for road maintenance. The governor uses this point to emphasize the necessity of a good roads commission. He will ask the state legislature this fall to name five men who will serve without pay to direct the expenditure of the highway fund.

The Detroit, Mich., aldermen voted 27 to 7 in favor of the maintenance of street or curb gasoline pumps. The corporation counsel had stated that the city had no right to grant permission for such use of the streets, but his opinion was over-ruled.

PHILADELPHIANS TO POOL TRUCKS.

Several of the dealers in the Reading Terminal Market, Philadelphia, Penn., have formed a stock company which will conduct a motor truck delivery to all sections of Philadelphia and to all points within a radius of 15 miles. The new delivery system will carry the products from the market directly to the homes of the consumers, thus giving the latter a quicker delivery and insuring that the goods will be fresh when they arrive at their destination.

Formerly the goods delivered on the outskirts of Philadelphia were shipped by railroad, but this service was found to be very slow and in many cases green goods were spoiled before reaching their destination. The delivery will be free, and will follow the same system as that used by the department stores. Orders have already been placed for the first fleet of trucks, which will consist of five White vehicles of 1500 and 3000-pound capacity.

ST. PAUL'S FIRE APPARATUS.

The St. Paul, Minn., fire department now operates 22 fire stations. For these stations it has 320 men, 19 horse drawn steam fire engines, one horse drawn gasoline pumping engine, one motor driven pumping engine, one combination chemical and hose wagon, three aerial trucks, eight ordinary trucks, which makes a total of 33 pieces of fire fighting apparatus.

In addition to this there are 11 automobiles for the use of the chief, assistant chief, battalion chiefs, superintendent of apparatus, superintendent of fire alarm, electrical inspector.

NEW YORK PLANS MUTUAL DELIVERY.

More than 50 associations of retail butchers, grocers and bakers are considering the adoption of the co-operative delivery scheme of Joseph Hartigan, commissioner of weights and measures of New York City. Commissioner Hartigan's plan contemplates the adoption of a centrally located depot to which all packages from the shops embraced in the system will be taken at hourly intervals. From the depot house-to-house delivery will be made after the packages have been assembled and sorted as mail is in the postoffice. The plan will be tried out in Brooklyn and motor trucks will be used, both to take the packages to the central depot and to deliver them finally to the house of the consumer.

TRUCK MAKES AN AGENT.**Owner of Palmer-Moore Machines Convinced of Quality by Service.**

Somewhat unusual is the experience of the Saratoga Vichy Springs Company, Saratoga Springs, N. Y., which, after using two Palmer-Moore 1600-pound delivery wagons for four months in its business, decided to make an agency contract and sell these vehicles in the section of the state of which Saratoga Springs is the commercial centre.

W. C. Moriarity is president of the company, and about five months ago he purchased the two machines for the distribution of bottled spring water in Saratoga Springs and vicinity, with the purpose of extending the area in which customers were served, which was impossible with horse wagons, and affording quicker service.

The wagons were fitted with open express bodies with cabs, and in regular work these were loaded with 30 cases of quart bottles, weighing about 1650 pounds to a load. The distribution was extended to Ballston Spa and Schuylerville, and the machines could take out from 30 to 100 cases of water a day, this being from one to about three and a third maximum freights.

The wagons were found very satisfactory and economical, although the drivers seldom stopped the motors save for lunch, and practically kept them in operation during the hours the vehicles were out of the garage. The result, after four months' use, was so satisfactory that decision was reached to sell the trucks as a department of the company, and to later on increase the equipment with one more machine, similarly equipped.

The Besser Manufacturing Company, Alpena, Mich., bid \$5200 for the plant of the Alpena Motor Car Company of the same city. The sale was confirmed.



Two Palmer-Moore 1600-Pound Delivery Wagons in the Service of the Saratoga Vichy Springs Company, Saratoga Springs.

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The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., NOVEMBER, 1914

No. 11

TRUCKS SAVE 50 PER CENT. OF DELIVERY COST.

Fleet of GMC Machines in Service of the Thedford Eltz Company, Coal Dealer, New York City, Operated in Heavy Traffic and on Hard Grades, and Not to Its Full Productiveness, Show Remarkable Economy.

ACTUAL economies obtaining from motor vehicle transportation cannot always be translated into values that can be expressed in dollars and cents. These may be regarded as intangible in the sense that they cannot be appraised from any other viewpoint than that of the owner of the equipment, yet business men will unhesitatingly state that these factors all have more or less worth. While variable as to value, each has an influence worthy of consideration, and taken collectively or separately these influences are cumulative and enduring.

of what has been realized. There may be the best of reason to know that business has been generally promoted, but no approximation of value can be established.

This statement is intended to emphasize that systematic promotion of public knowledge of any business enterprise cannot be represented by cash values. In very few instances are the factors mentioned regarded as important. Instead, the operating costs are compared, and the difference between those of the motor or horse equipment is looked upon as the in-



The Three Five-Ton GMC Trucks Purchased by the Thedford Eltz Company in 1912, with the Steel Bodies for Gravity Discharge by Chute, Similar to the Horse Carts.

When results are reviewed, no one will deny that increase of area from which constant patronage can be drawn, regularity of delivery, quick deliveries of special orders, elasticity of service in the event of any unusual demand, general business promotion, advertising and greater satisfaction of customers are each of material importance. Any one of them is worth special endeavor to obtain, and in some instances considerable amounts are expended with the hope of accomplishing these precise results. Definite amounts of money may be expended without accurate knowledge

crease or decrease, as the particular case may be.

But when a saving of more than 50 per cent. is made in expense of operation, with trucks operated in the same work as horses, with the machines not always worked to their capacity, and in conditions that are by no means advantageous, one may disregard the intangible values for the real, and only express surprise that horses are used at all.

Transportation Economy Based on Experience.

Yet the economy that has been stated is not imaginary or thoretical. It is based on an experience of

more than two years, in which one may charge against the trucks whatever experimental expense that may have been incurred. As a matter of fact the saving the second year was more than the first, and the showing for the third year is expected to be productive of greater saving than the second. One might assume that because of the wear of the machines the cost of maintenance would be more each succeeding year, and that with continued service there would be less investment value from depreciation, but the purpose is, by careful upkeep, to make the trucks endure as long as they can be productive of economy.

Practical Economies of Coal Haulage.

This remarkable efficiency is the experience of the Thedford Eltz Company, which has a large coal business, with a pier yard between 55th and 56th street, at the North river, New York City, and which has a number of yards located on the West Side. The main office of the company is at 615 West 57th street, where what is known as an emergency yard is maintained, and there is a much larger yard in 64th street, between Amsterdam and West End avenues.

Many dealers who have investigated the use of motor trucks in coal delivery may be of the opinion that machines are not economical because of the general character of the business. Small loads, short hauls and frequent and long stops are the reasons maintained by the majority of coal dealers why the transportation equipment should be as cheap as possible, and seemingly animals represent the commonly accepted standard of maximum efficiency for a given expenditure.

Operating Condition Not Unusual.

The Thedford Eltz Company is not different from many other concerns in the same business in the Metropolis. It has been long established, has developed a very satisfactory class of patronage, has reasonably satisfactory location, and its yards are established for advantageous distribution. It is conservatively managed, and while the officials are ever willing to practically economize, they desire to be absolutely satisfied that investment will be productive before they sanction it. But at the other hand they realize that productiveness is largely dependent upon administra-

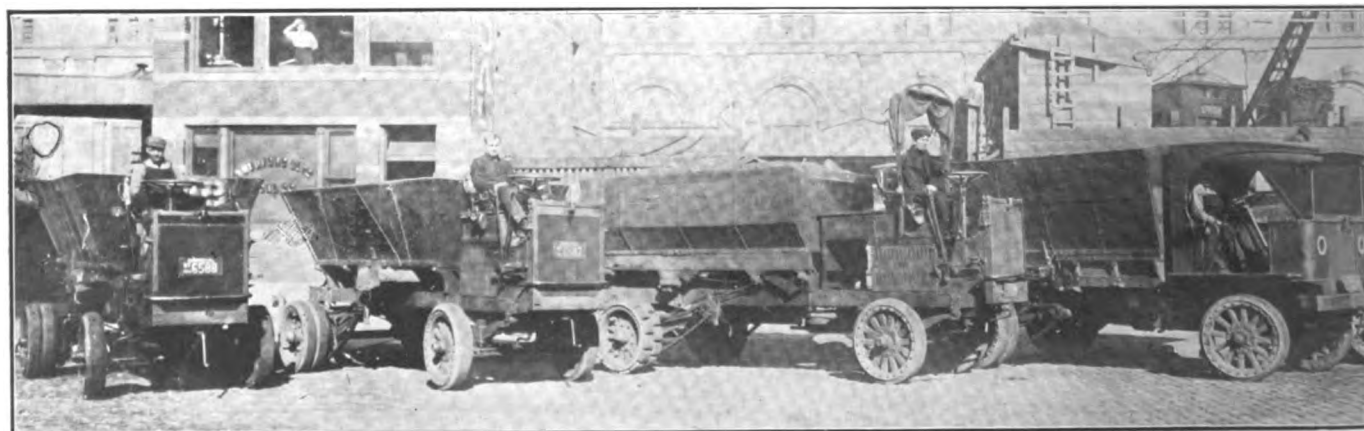
tion, and that they may have to adopt new methods to obtain the fullest results.

In the spring of 1912 Secretary Frederick Gehring of the company made inquiry into the possibilities of the use of motor trucks for coal delivery, carefully appraised the conditions of the business with reference to utilizing machines, and studied what from his experience appeared to be the work in which they could be made productive. The greater part of the custom is from those who consume anthracite coal, this including contracts with hotels, apartment houses, office and manufacturing buildings for continuous supplies, and from families and others whose purchases are made occasionally. As might be assumed, the deliveries range from extremely small orders, several of which may be delivered by a single wagon, to capacity loads.

Business Covers the West Side.

The area in which the company usually does business is between 14th and 140th streets, and from the east to the west sides of Manhattan Island, this being about six and a third miles long and from two to three miles wide. Occasionally deliveries are made outside of this section, but generally the haulage is within the bounds stated. When practical the coal is hauled from the pier, especially if the loads are to the capacity of the vehicles, but the supplies at the other yards are drawn upon when there will be a saving in haulage. From the pier south to 14th street is approximately two miles, and from the pier north to 140th street is about $4\frac{1}{4}$ miles. From the pier to the 64th street yard is about 1100 yards, so that in deliveries north something more than a mile is saved by loading there instead of at the water front. Considering these savings of haulage the advantages of the several yards are apparent.

The first purchase made was three GMC five-ton trucks. Two of these were fitted with steel bodies, so built that the load centred by gravity in the middle over a discharge outlet, closed by a grate operated by a hand lever, to which a chute can be attached. The outlets were originally at one side only. Later on the necessity of an outlet at either side was apparent, and the bodies were changed so that by a second lever



Four of the Five Trucks Now Used by the Thedford Eltz Company, Which Are Not Worked to Full Capacity in Order That the Full Value of the Horse Equipment May Be Realized.

the angle of the bottom could be alternated so that the loads could be discharged with but little trimming. But as the chutes cannot be placed above the chassis frame, the limit of the length of the chutes that can be used is 12 feet. The other body was elevating, this being raised by a hand crank actuating a train of gears and shafts with large skeleton cams, the body being kept in position by vertical members movable in guides in the chassis frame. This body was similar to the others in that it discharged at the sides, and with it a load could be unloaded by gravity through a chute 18 feet in length. These bodies were practically the same as those used with horse carts.

Conditions Not Favorable for Quick Delivery.

The delivery of coal in New York City is seldom in conditions where time can be saved. In some instances architects have located the coal pits where they are readily accessible, so that chutes can be extended from the carts and the loads discharged by gravity, but these are decidedly the exception. More often they cannot be reached save from narrow alleys or courts, where chutes cannot be used, and as the coal cannot be discharged quickly it must be carried in. Innumerable conditions that cause delay could be cited, but these are similar to those met with in practically every other large city, and assumedly any cause that will occasion a truck to be held precludes the full realization of its greatest usefulness.

In New York City the charges for delivery are based on the conditions for unloading, and those who are accessibly located pay less than those who are not, so that the dealers are compensated to some extent for the loss of the time of their equipment. When the facilities for unloading are known charge can be made that will be based on an estimated waiting period, but when not known there is probability that the estimate will not be adequate.

Stable Converted into a Garage.

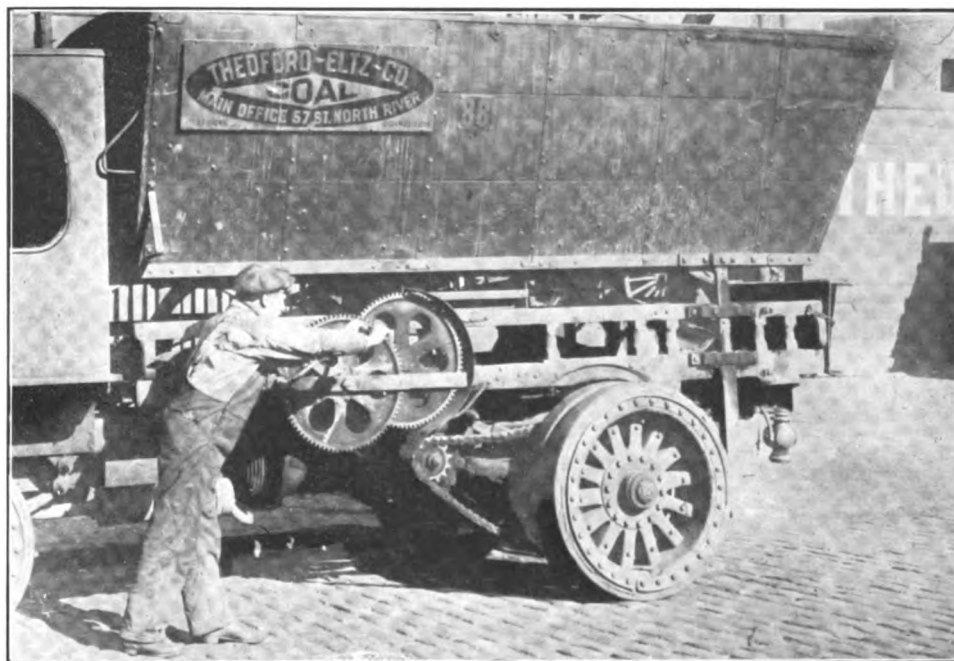
With the purchase of the machines provision was made for a garage at the 57th street yard. A section of a stable building was converted to meet the requirements of the building law and made practically fire-proof. The floor was concreted and constructed so that it might drain, and this was sufficient for the storage of six machines. A gasoline storage equipment was installed, a work bench with electric driven bench tools was provided, and later on a drill press and grinding machine were added. A portable crane was purchased so that one man could handle the heavy

work unassisted, and the garage was arranged so that there was ample space for working on the trucks.

A mechanic trained from long experience with GMC trucks was engaged with the understanding that he was to keep the machines in operative condition and that so far as possible this work was to be done during the day, but he should devote such parts of the nights as were necessary to repairing. The purpose was to maintain the trucks so that their full efficiency would be realized, and there should be practically no time lost when they could be profitably operated.

Loads Generally Hauled Up Grades.

The greater part of the delivery of the company is west of Fifth avenue, which thoroughfare is approximately the crest of the island to 59th street, and from this point north Central Park West to 110th street, Amsterdam avenue to 125th street, and Broadway beyond may be regarded as the highest longitudinal thoroughfare. This statement is made that one may understand that the loads must be hauled practically



Gravity Discharge Body Equipment That May Be Elevated so as to Unload by Gravity Through a Chute Attached to a Side Outlet.

from tidewater up grades when going east, and that there are decidedly more gradual gradients when the haulage is north or south. Returning with empty vehicles the descending grades are not particularly saving of machines or animals.

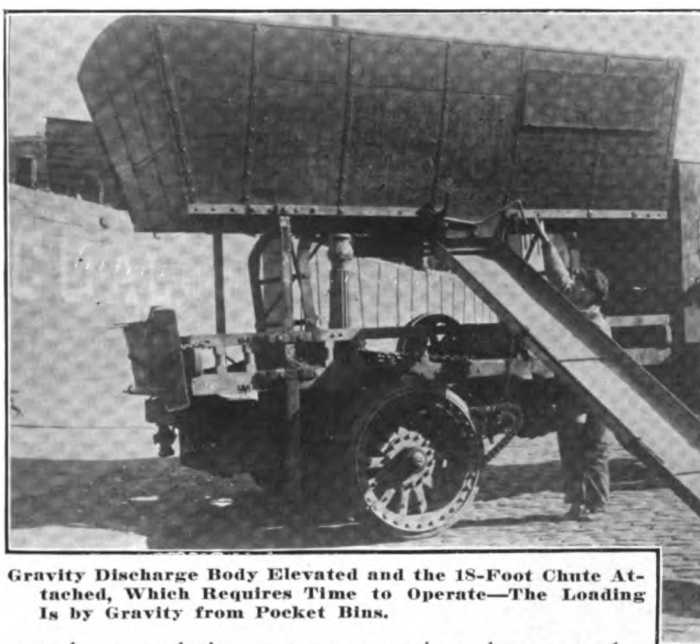
The policy of the company, which then had 50 horses and adequate wagon equipment, was to haul capacity loads with the trucks, using them when the hauls were long, but to work the horses normally at all times, and when these could not make the deliveries to utilize the machines. The reason for this was that the expense of the horses was practically the same, whether they were worked or not, and to keep them idle and use the trucks was to reject service that must be paid for, and would be lost unless the animals were in harness, while the cost of the machines when not

in service was confined to overhead charges.

That is to say, the trucks might be laid up a day and there would be no shrinkage in service value and the operating cost would be saved. If the period were extended there would be no loss, and the drivers could be worked elsewhere and their time saved. But horses cannot remain idle and they must be exercised, if not worked, while the other expenses must continue.

Full Productiveness Not Realized.

Because of this policy the trucks were not worked unless there was need of them, and the greatest measure of productiveness was not realized. There are those who will say that no machine ought to be purchased unless it can be used to its capacity, but there was no desire to sacrifice the horses, and the purpose was to use the trucks in all kinds of work so as to determine what their services were actually worth in coal delivery. But while working accurate record



Gravity Discharge Body Elevated and the 18-Foot Chute Attached, Which Requires Time to Operate—The Loading Is by Gravity from Pocket Bins.

was kept, and the cost of operating charge made sufficiently large to be thoroughly safe when compared with the same class of work, or the same work done with horses. Weighing the coal insured against overloading, and governing the trucks protected them against fast driving, two very prolific causes of accident and deterioration.

In the use of the trucks the maximum haul will average nine miles for the round trip and the minimum haul two miles, so that what may be considered as an average of all hauls will probably be considerably under four miles. Taking the record of four machines for a single day, in which one carried three loads with a total mileage of 13, a second carried four loads with a total mileage of 20, a third carried seven loads for a total mileage of 18, and the fourth carried four loads for a total mileage of 19, gives average hauls for the first of 4.33 miles, for the second of five miles, for the third of 2.57 miles, and for the fourth of 4.75 miles.

These machines carried 18 loads of five tons each, and the total distance was 70 miles, this being an

average of 3.88 miles for each separate trip, and an average of 1.94 miles for each load hauled. While this is merely an average of the figures of haulage for one day for the four machines, it serves to illustrate that the work is what might be regarded as short distances for the profitable transportation of capacity loads. Yet with this condition, and with the machines not used so as to be most productive, Secretary Gehring says that the trucks are showing an economy of more than 50 per cent. as compared with the cost of work done by horses. When one realizes the loss of time in making deliveries, this is remarkable efficiency. To load and trim a truck by gravity at the yard takes about five minutes. Discharging requires about the same time. From 19 to 21 capacity loads are hauled from the North river pier to the 64th street yard in a day, this being a round trip of a mile and a quarter. Taking 20 loads for an average for a day, this means a tonnage of 100 and a total distance of 25 miles. All of this is hauled up a considerable grade.

The trucks are seldom out of service for an overhaul, for they are well maintained. Spare forward and rear wheels are kept in the garage for use in the event of accident or the need of a tire change, so there shall be very little delay. During the summer months, when the demand for coal is comparatively light and there is not so much need of the trucks for haulage, contract work is done, for the horses are then worked. There is no desire to keep them idle.

The machines are not always busy for the period between June and October. Another year Mr. Gehring says that he may lay up the machines, save one, cancel the insurance during the period they are withdrawn from service and save that charge, and as the life of the trucks will be increased, he believes that there will be practically no expense

for interest or depreciation.

The work of the three trucks originally bought was so satisfactory that a year ago another was purchased, and when the company bought the business of another company in February of this year, it acquired 16 horses and another six-ton truck. The equipment of the company is now five machines and 60 horses. The desire is to wear out the horse equipment and eventually replace it with trucks, and aside from purchasing the business stated no animals have been bought for about two and a half years. The process of replacing the animals will probably cover a period of several years, and during that time there is reason to believe that still greater economy can be obtained.

The works of the International Harvester Company, Milwaukee, Wis., are working at full capacity again, after running with a small force on short hours for several months past. The International Company manufactures the I. H. C. trucks.

MOTOR TRUCKS CREATE GREAT BUSINESS.

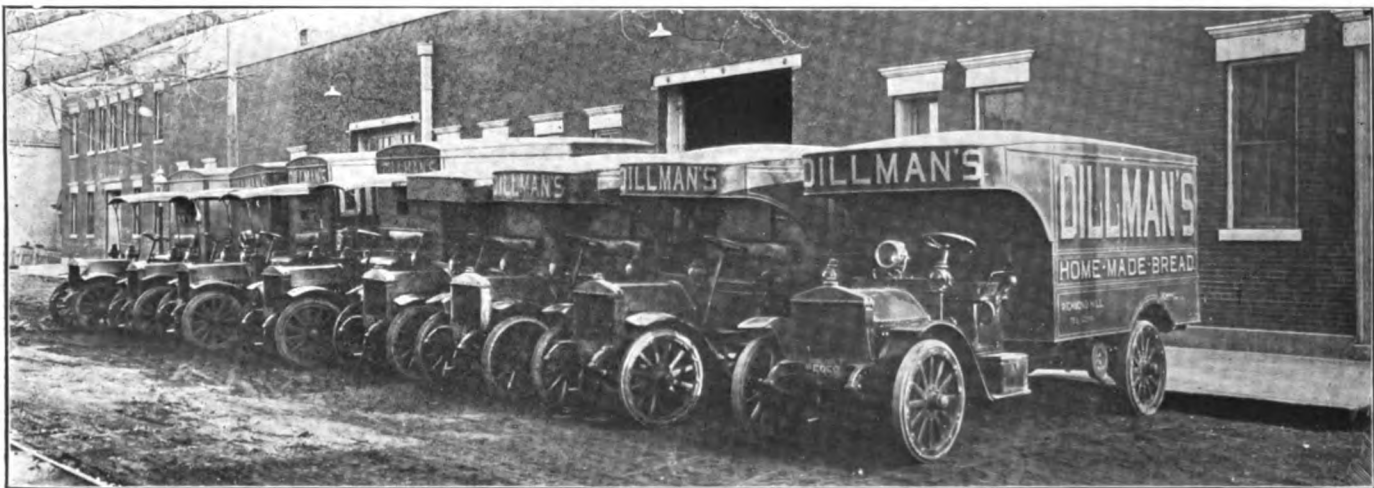
Baking Company Developed from Home Bakery in Suburban New York in Seven Years Makes Distribution Over 60-Mile Section of Western End of Long Island.

LOCATION is assumed to be a very important factor in business, especially when the products are perishable and must be quickly distributed. Competition must be met in whatever form it may develop with reference to quality, quantity, price and appearance, and when these are at parity delivery will undoubtedly be a material influence with those who have their own patrons to serve to best advantage and are anxious to create and retain custom.

Large concerns are expected to be enterprising and to afford service that will be promotive of trade, and yet some remarkable instances of business development are to be found that is a result of the utilization of motor vehicles. One of the most interesting illustrations of what has been accomplished practically through automobile delivery is that of the Dillman Baking Company, located at Richmond Hill, L. I., a

been due to the willingness of the management to exploit its products, no matter what the competition met with, and to serve its customers even better than they have been served by its competitors. The public has recognized quality and service, and the continued expansion of the area in which business is done has been justified by the satisfaction of the customers. Covering the territory the company does would be impossible with any other means of distribution, but the limitations have by no means been reached and there is every reason to believe that there will be continued extension of operations.

Brooklyn is practically at the west end of Long Island, and while what was the old city is along the East river across from Manhattan Island, at the south is Coney Island and Jamaica bay. Extending from the south shore westerly toward Coney Island is a nar-



Fleet of Federal Motor Trucks in Service of Dillman Baking Company, Richmond Hill, L. I., Used to Make Distribution on Routes Ranging from 56 to 120 Miles Long.

suburb of Greater New York, between Brooklyn and Jamaica, which is close to the Woodhaven Junction station of the Long Island railroad.

Seven years ago a little home bakery was established in a cottage at Woodhaven Junction, and the products were distributed through the village by a push cart delivery. Today this concern has a splendid plant, equipped with the finest machinery, with every facility for producing bread, and distribution is 35 miles east on Long Island, throughout Brooklyn and the villages that are south of that borough, and has been extended to Staten Island. From east to west the distributing area is more than 60 miles, and from north to south practically the width of Long Island is covered, while the Bronx section of Greater New York has also been considerably developed.

The success that has attended the company has

row neck or arm that is known as Rockaway beach, and from this arm extending easterly for perhaps 30 miles in a series of islands. To reach Coney Island through Brooklyn one must circle the west side of Jamaica bay, and to reach Rockaway beach one must circle the east side.

Location Advantageous for Distribution.

Jamaica is directly north of Jamaica bay, approximately midway between Jamaica bay and Long Island sound, and from Jamaica several main highways radiate like the fingers of a hand, one to and along the south shore, another that reaches the north shore at Huntington, and between these are two that afford communication between some of the island villages. Another that may be regarded as the thumb, goes directly north to Flushing. From Jamaica another road leads to Long Island City and thence there is access

to Manhattan Island by the Queensboro bridge.

Richmond Hill is west of Jamaica, and this section is made up of a number of villages, most of which are along the line of the Long Island railroad. The Dillman Baking Company plant is in what is practically a residential section, and it is about three miles west and slightly south of Jamaica. Geographically the location is excellent for long distance delivery, for there is access direct to practically every main highway, and along these at short intervals are numerous villages that are rapidly increasing in population, and which are generally on the lines of railroads.

Delivery a Large Factor for Custom.

The villages that are near the shores have two classes of residents, those who reside there throughout the year, and those who have suburban homes, which are occupied from spring to autumn. The populations are fluctuating more than might be expected because of the proximity to the metropolis, yet while there are very well systematized railroad facilities, which would seemingly stimulate delivery from New York City, unless means for distribution are maintained in these

sought, the building being equipped for bread baking, and with this as a beginning the present plant was developed, which is operated 24 hours a day, and is now producing many thousands of loaves. Bread is extremely perishable, because the general demand is that it be "fresh", which means that 24 hours after baking it is greatly reduced in value, although for food it has not in the least deteriorated, and practical business, from the viewpoint of the baker, is to have the order of the customer who can be reached but once a day delivered as early as possible after the opening of the store. This policy obtains with reference to every patron, and the big problem is how to deliver to all in the comparatively few hours of the early morning.

Some of the Delivery Problems.

One method would appear to be short routes, light loads and fast vehicles, but this could only apply to a comparatively limited area, for as the routes lengthen and the loads are increased the speed must necessarily be decreased, and there is the time factor that must be regarded. Shipments can be sent considerable distances by express provided that there are means of distribution at the point to which the goods are shipped, but the shipping expense must be taken from the profits, for custom has standardized the price of bread and this cannot be exceeded. Not only this, railroad schedules are not sufficiently dependable to justify a business in which there is keen competition risking its trade upon them, and, as a rule, there are not a sufficient number of late night or early morning trains to serve any given locality, even in New York City.



Type of Body Used for Equipping the Federal Trucks of the Dillman Baking Company. These Taking the Capacity Weight of Bread Cases and Preventing Overloading.

villages the tendency is to purchase in the villages, where the shops and stores are expected to afford such service as might hardly be expected in communities of such size.

The growth of the Dillman Baking Company has been due to several reasons, one of which is quality. The little home bakery was in competition with stores and other baking companies and the development campaign was made on the basis of superiority of materials, preparation and sanitation of the bakery, as well as uniformity of the products. Extreme care was taken to preserve the purity of the bread and to keep it from exposure to the air or contamination from handling, and as soon as possible after being taken from the ovens it was wrapped in oiled paper, so that it was thoroughly protected and would dry much more slowly, preserving the freshness of the bread for a considerably longer period. This was the first bakery in the East to so prepare its bread for delivery.

The business increased and a new location was

No bakery can serve any specific territory to the exclusion of competitors, and, of course, delivery equipment in excess of actual requirements would be an unnecessary expense, so the distribution problem that must be practically dealt with is to fill all orders within the comparatively few hours in which deliveries can be made, retaining all regular customers and developing as much additional patronage as is possible, and wherever practicable adding to each route without greatly increasing its mileage. This general policy is followed because of the limitations of delivery equipment, time and the size of the loads that can be carried.

Limitations with Horse Vehicles.

When the Dillman bakery had sufficient business a horse and wagon was used for delivery, and this equipment was added to as custom increased until there was a number of routes radiating from Woodhaven Junction, but the distribution being largely in Jamaica. The longest route covered was about 18 miles, this being within a radius of about six miles.

Orders from stores further away could not well be considered because of the cost of special delivery, and the only method of development appeared to be to increase the area of distribution. This was not practical with horse vehicles unless a station could be established to which large loads could be hauled direct and from there delivered by light wagons.

There was, however, the opportunity for increased business, due to a demand that was established, and which promised material results. The location of a distribution point meant investment that would not immediately be productive, and the alternative was a different form of delivery equipment that would make possible extension of the routes. The company decided to try a light gasoline delivery wagon and to make delivery in the sections from which the largest demands were received. The machine was moderate in price and was reasonably well constructed, but it was too fast and too light for the work, as well as being more or less experimental.

Experiment Justified More Machines.

This vehicle demonstrated possibilities could it be maintained in serviceable condition, and while it was not a practical success when regarded from the viewpoint of continuous service, because of frequent failures and considerable expense, due in some measure to lack of knowledge and inexperienced drivers, the company was convinced that machines would be a profitable investment. Then an order was given for three light delivery wagons and the first purchase was used for general purposes and special order deliveries, and with this equipment, in addition to the horses, the routes were extended in several directions, covering considerably more area and taking in some of the eastern part of Brooklyn.

When these vehicles were bought a small garage was established and a mechanic was engaged whose work was to keep the machines in operative condition, and later on five more of the same type of vehicles were bought, this making the total nine. The second series of wagons, however, did not give the same degree of satisfaction because of changes in construction, and they were not as enduring or as reliable, although the experience with them would naturally be expected to produce better results. Next a number of larger capacity machines were purchased and these were used with decidedly better results, but they were a shaft driven construction and of high power, and they were worked too hard by the drivers—that is, they were driven much too fast both with and without loads, and deteriorated because of this fact. These were used until April of this year, when eight Federal 3000-pound trucks were bought, and these are now in use. The best illustration of the satisfaction obtaining from these is the fact that three more have been ordered for delivery Jan. 1.

Body Construction Limits Loads.

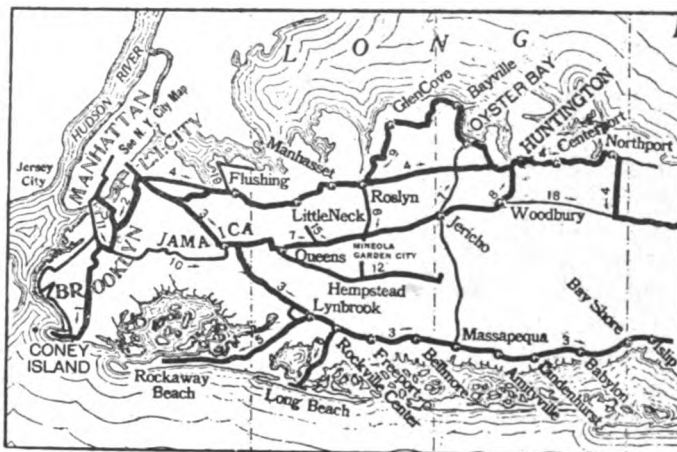
The Federal chassis have been equipped with a special type of body, having a substantial wooden frame with steel panels, these each having a capacity for 40

cases, each containing 32 loaves of bread, and the total load, including the cases, is between 3100 and 3200 pounds, the weight of the filled cases ranging from 77 to 80 pounds. Determining body capacity was a matter that required careful consideration. All of the bodies constructed up to the present Federal equipment were too large and the drivers were inclined to overload them rather than return for additional cases when the freight first taken out was insufficient, and there is no question that this possibility of overload was one of the causes that contributed toward the rapid wear of the earlier machines.

As will be noted from the accompanying illustrations, these truck bodies are built with rear doors, that may be securely locked, and when closed the contents are protected from dust and moisture. The cases are packed in tiers and are secured from movement, so that the driver does not have to handle his load but once in distributing it.

Routes from 56 to 120 Miles.

The company uses four of the Federal machines on the long routes, and these are from 56 to 120 miles, being covered every day in the year except Sundays.



Map of the Western End of Long Island, Showing the Area Covered West of Northport and Bayshore, and the Bronx in Greater New York, a Territory About 60 Miles Long.

so that the mileage of all of these machines is much in excess of what would be considered normal service. With the purchase of trucks the routes on which they were used were extended materially and naturally the highways that radiate from Jamaica east were followed. About two and a half years ago that along the south shore was extended to Bayshore, this serving the villages of Springfield, Valley Stream, Lynbrook, Rockville Center, Baldwin, Bellmore, Freeport, Seaforth, Massapequa, Amityville, Babylon and West Islip, the round trip being 80 miles daily.

Another route was developed through the centre of the island, which serves Jamaica, Queens, Floral Park, New Hyde Park, Mineola, Garden City, Hempstead, Jericho and Hicksville, and intervening points, this having a mileage of 60.

A year ago the north shore route was established, this taking in Flushing, Little Neck, Douglaston, Manhasset, Roslyn, Greenville, East Norwich, Cold Spring Harbor, Huntington, Centerport and North-

port and other villages, this having a regular mileage of 120. The shortest of these long routes serves Woodhaven, Canarsie, Bergen Beach, Sheepshead Bay, Brighton Beach and Coney Island, the average mileage being 56.

Distribution in Brooklyn and the Bronx.

From the bakery distribution is made in the eastern section of Brooklyn as far west as 76th street, and south from that boundary, and other routes are on Staten Island, which is reached by ferry from Brooklyn. The customers in the Bronx are served by horse wagons from a distributing station at 136th street and Southern boulevard, but the stock is carried from the plant to this station by a four-ton truck that makes two or three trips daily, carrying a freight of 100 cases. The distance from the bakery to the station is 16 miles, this requiring either 64 or 96 miles a day for this machine, according to the business. The logical development will be additional trips for this truck or a second and larger vehicle. With the increase will be expansion of the routes and the utilization of motor delivery wagons.

There is in Brooklyn what is known as a "relief station". All of the Brooklyn wagons and machines start from the bakery with full loads, some of which will not fully supply the routes covered. To return to Richmond Hill would take too much time and would be too costly, so a supply of bread is carried to the station, which is located so as to best convenience the drivers, and this is drawn upon as required. This will lead to the location of a distributing station, and perhaps more than one, with the view of saving the time of the men for work developing the routes. The distribution system has been planned with the view of continuing it, no matter what the degree of expansion. The disposition is to eliminate horses wherever this appears to be practicable.

Limitations of Motor Truck Delivery.

There is a limit to the length of route that can be covered by a single vehicle, because the time available for delivery, the load that can be carried and the speed are three very important factors. Distribution must be made to have the dealers supplied by a reasonably early hour in the morning, preferably before the stores are opened. While theoretically the least mileage for delivery is the most economical, to restrict business to specific areas would be to place limitations upon expansion. The loads that can be carried must govern the speed of the vehicles very largely. Maximum loads can be carried at the start, for they are constantly decreased, and as a matter of fact the average load is delivered with a view of lightening it as rapidly as is possible. Where practicable the routes delivery is made in what might be termed loops, but the long routes are straightaway, the returns being made with loads of empty cases, which are comparatively light.

The illustration showing a line of Federal machines was made in front of the loading shed, which also serves as a garage. There is a shop where overhauls are made, but adjustments and minor repairs are made

in this part of the plant. The loading shed can be closed so the men are protected from storm and cold, but there is a limit to the number of vehicles that can be loaded. This necessitates loading in relays, which will suffice until the trucks and wagons will be delayed. Loading is begun early in the evening, for the long route machines are started away at 11:20, and from that hour at night the work of distribution for the following day is begun. Sufficient time must be allowed for storms and delays on the road, for the drivers are expected to reach the last customer by 7 o'clock, and as many stops must be made returning, for the drivers make daily collections and pick up the empty cases.

Night driving is hard on the machines when fast time is made, no matter how well a man may know the roads, and a great deal of care must be taken to avoid accidents. In the event of storms, and especially snow, when the roads must be broken by the trucks, and with capacity loads, much depends upon the good judgment of the drivers.

The governing of the speed of the machines has been found to be extremely satisfactory in that they cannot be driven fast, and this is a decided protection. The company has had plans prepared for a garage, 100 by 100 feet, which will be built the coming spring, and this will be fitted with every facility for maintenance and repair. Now the shop and the loading shed are separate, which is not a convenient condition. The facilities are limited as well. With the completion of the garage the equipment will be considerably increased and the routes will be rearranged. The growth of the company has been rapid, and has been made possible through the use of motor vehicles. Without them the business would still be confined to a small area. Of course what has been stated applies wholly to wholesale business, for the company does not do retailing save at the bakery. So far as retail routes are concerned, these have not been established, and there is no probability that this class of business will ever be considered.

PASSENGER SERVICE IN DELAWARE.

The Postles Auto Brokerage Company, Wilmington, Del., is inaugurating a daily automobile passenger service in Kent and Sussex counties, operating from a base at Georgetown. This territory is poorly served by the railroads and the increase in facilities should prove a valuable factor in its development.

WILL HOLD IMPORTERS' SHOW.

Despite the war conditions abroad, the Automobile Importers' Alliance will hold its annual salon next January at the Hotel Astor, New York City, as usual. The Paris and London shows have been abandoned this year, so the New York show will be about the only exhibition in the world to show foreign cars.

HAULAGE ECONOMIES OF BAKER TRUCKS.

After Eight Years of Experimental Service at New York City Warehouse, Pittsburgh Plate Glass Company Adopts Electric Machines for Long Delivery Hauls.

EIGHT years is a long period to devote to experiment with motor vehicle haulage, and yet the Pittsburgh Plate Glass Company, the largest concern of its kind in the world, believed in working out from practical experience the detail information necessary to determine operating utility and economy. The company had accurate knowledge of animal transports, but the possibilities of motor haulage were unknown, and with the purpose of obtaining facts on which sound judgment could be based, a policy was determined that was extended over a much longer time than would be believed necessary to obtain the data desired.

Nearly 10 years ago the company bought its first machine, a $3\frac{1}{2}$ -ton Vehicle Equipment Company's electric truck, and stationed it at the Manhattan Island branch in New York City. Now the company has 12 electric trucks in service, three of which are attached to the two branches in Greater New York, these having been purchased within the past two years. The main office and works of the company are located at Pittsburg, and in 27 different cities are branches that are known as "warehouses". These branches have separate existence, being operated according to a system that is directed from Pittsburg. For this reason details of any one branch are not generally known to the others.

In Greater New York are two warehouses, the larger at Hudson and Van Dam streets, Manhattan, and the other at Brooklyn. At the Manhattan warehouse, or rather in connection with it, the experiments with motor vehicle haulage were made. The reason was that no other branch would have greater or more diversified needs for transportation, and the

demands for service in New York are very exacting. Until the truck was acquired all delivery had been made by horse wagons, the vehicles being of different sizes. The company deals in plate glass, supplying it either ready for cutting, or cutting it and glazing windows, doors, skylights, etc., and the loads delivered from the warehouse are frequently large.

Handling of Plate Glass an Art.

The handling of glass to minimize breakage is seemingly an art. The sheets or plates are received from Pittsburg packed so that they must be carried in certain positions, which will best protect them. Glass is generally carried on edge, which minimizes the strains, and the crates for the large plates are exceedingly thin. Unless plates are approximately the same size they are not packed in the same crate, because of the weakness of the larger where it overlaps the smaller.

The standard thickness of plate glass is quarter inch. Glass is manufactured in widely varying thicknesses, but all variances from the standard are special and are generally supplied to specification. The dimensions of glass may be any requirement up to 156 by 220 inches, or approximately 13 by 18 feet four inches, and plates of large size can only be handled by experienced men who have the facilities for moving them practically free from strains.

Glass Will Not Endure Shock.

Glass will not endure shock. It may withstand considerable pressure under some circumstances, but this is a very variable factor. A peculiar characteristic of glass is that a plate of large dimensions that might sustain pressure of 200 pounds two or three inches from the edge might not sustain a pressure of more



Two of the 11 Baker Electric Trucks Owned by the Pittsburgh Plate Glass Company, Operated from the Manhattan Warehouse at New York City.

than three pounds at the centre, and because of this weakness, which increases with the increase of size of the sheets, delivery of glass by road vehicles necessitates extreme care. Plate glass runs into value very quickly as the dimensions are increased, and three or four sheets of large size might represent a considerable sum.

So far as is practical all glass is handled in the crates, but a great deal of it must be delivered practically unprotected. While the workers are expert in handling glass and can deal with any situation that might arise, the fact remains that the care necessary cannot be given save at the sacrifice of time. The loading of the glass at the warehouse may be governed so as to obtain an excellent efficiency, but delivery, where conditions cannot be controlled, must be made first with a view of protecting the glass from damage. After that economy of time of vehicle and labor are to be considered.

Because of the peculiar requirements of the company delivery expense cannot be compared with the

cured, yet readily removed. This platform was in one sense a rack extending beyond the sides and ends. This was practically the same construction that had been used with the horse wagons. This same form of platform may be noted in the illustrations. It is covered with a thin mattress on which the glass plates are laid flat, and a series can be carried in this manner with nothing more than heavy paper between the plates, provided that they are of the same size. The purpose of the paper is to prevent scratching.

Where the plate dimensions vary the stresses are considerable at the overlaps, and for this reason the loading of uncrated plates must be very carefully done. Not only this, but extreme care must be exercised in unloading to prevent breakage. The largest plates that can be carried on such a rack cannot exceed eight feet in smallest dimension because of the need of clearance in traffic. Plates of larger size are carried in the crates and with the weight resting on the edges.

The Pittsburgh Plate Glass Company owns and utilizes practically all of the property of the block on which its Manhattan warehouse stands, and there is a central court or area that is reached by a driveway through the building from Van Dam street. This area is used for storage and shipping, all of the stock being brought into and taken from the building through this driveway. A part of the driveway is given over to storage of the largest crates, there being no entrance to the building large enough to admit them. These crates are approximately 13 feet six inches by 19 feet.



Two-Ton Baker Electric Truck Equipped with Large Battery for Making Long Hauls, That Has Made a 66-Mile Delivery Trip to Glen Cove, L. I., on a Single Charge.

cost of similar service to other concerns. The equipment necessary for the vehicles is not costly, but it must be adapted to them. Appearance is not regarded. Efficient service is the first consideration and this must be afforded.

First Machine Bought in 1910.

The first machine purchased by the company for the Manhattan warehouse was a 3½-ton electric truck, built by the Vehicle Equipment Company, and it was of the so-called pedestal type, driven by two motors, with the driving pinions meshing with internal ring gears mounted on the rear wheels. The truck was delivered in 1904, and while mechanically well constructed, it consumed more current than do present day machines of similar capacity, and its radius of movement was comparatively small because of the limitations of the batteries.

The truck was fitted with a body of the express furniture type, this having sides and an end gate, there being placed on the top of the body, when occasion required, a substantial platform that could be rigidly se-

Garaging the electric truck was a problem, for at the time it was purchased there were very few public service stations, and those available were considerable distances from the warehouse. To go to and from any garage would require considerable current, and from the viewpoint of economy, as well as having the machine directly supervised, garaging near the warehouse was desirable. Superintendent W. L. Williams, who operated the machine with animal wagons and trucks, decided to use the driveway as a temporary garage, and although the street end was closed at night by a gate, the area end was open, so that the temperature was always that of the atmosphere.

Battery Problems Were Worked Out.

After the machine was placed in service the battery limitations were the greatest problem to be dealt with. Mechanically the truck was comparatively satisfactory, it having excellent endurance and seldom being out of service, but not only was the battery heavy and small in mileage, but it deteriorated rapidly. A small room in the warehouse was fitted as a charging plant,

a panel installed, and this was placed in charge of the warehouse electrician, who was also required to give whatever attention was necessary to maintain the machine in an operative condition.

Despite the fact that the battery was found inadequate to realize the fullest value of the truck, the vehicle was by no means a failure. It was markedly superior to animal wagons or trucks because of its speed, and despite the time lost because of the loading and unloading of the fragile glass, deliveries were made more quickly, and time was a very important factor. The driveway garage was found to work out practically and economically, minimizing the expense, and the battery was removed from the machine at the end of the day, recharged during the night and installed the next morning.

How Maintenance Cost Was Minimized.

The deliveries from the warehouse are made throughout New York City and its suburbs and, logically, the longest hauls were made by the truck, but this work was limited by the battery capacity and the difficulty of obtaining boosting charges where the mileage of a haul was in excess of the available current. Later a special battery was built that was something better than the first, and this led to the trial of several batteries, each of which showed improvement. Superintendent Williams, who was responsible for the purchase of the truck, kept accurate record of the work done, and he was confident that it was economical and could be made very profitable because of the comparatively small expense of maintenance and upkeep. By eliminating the usual garaging charges, and with much of the work done by the regular employees of the warehouse, he had made the operating cost considerably smaller than might be expected under almost any other conditions.

The batteries constantly improved and each renewal gave increased vehicle capacity, and in 1910 a change of charging plan was made by purchasing a second battery, so that two were available, these being used alternate days of the week and being charged during the night, so that if necessary an exchange could be made to obtain additional mileage. This system was found to afford extremely good results. The battery maximum was always insured, with ample reserve in the event of the need of additional work, and regularity of charging and discharging afforded extremely long life and decided economy. One battery was in service for three years, this being the longest period one installation was given continuous use.

First Machine Served Eight Years.

The machine was always dependable from every point of view, and its efficiency increased with the improvement of the batteries. Within its mileage limitation it was thoroughly reliable. When the truck had been used for eight years, although it had been well maintained, it evidenced its long service and it lacked efficiency because of the current consumption of the two motors. From the nature of the work value of service cannot be established by the usual measures,

and the best determination is that made by Mr. Williams, who worked it against horse wagons and knew its capacities and limitations.

In the autumn of 1912 the old machine had practically reached the limits of its usefulness and it was disposed of. But without it the delivery service was handicapped materially and a Baker 3½-ton truck was purchased that was delivered in January of 1913. This was a standard machine with the side chains enclosed, and it was fitted with a platform stake body. The battery was the regular 42-cell 17-plate MV Exide cell equipment. This machine had the same load capacity as the first truck, and a rating of 40 miles to a battery charge. This was utilized in practically the same manner as was the original truck, but longer hauls were made and delivery was improved because of the increased mileage.

Twelve Trucks Bought in Two Years.

The results from this vehicle were extremely satisfactory, so much so that since that time 11 other trucks have been purchased and stationed at warehouses where the conditions appeared to justify. These are two and 3½-ton machines, and of these 11 are Baker vehicles. In September, 1913, the second truck was purchased for the Manhattan warehouse, this being of two-ton capacity. It was a standard model, but was fitted with a battery box sufficient to take a battery of 42 17-plate MV Exide cells instead of the usual 15-plate cell, this size having 224 ampere-hours capacity against 196 for the 15-plate cell, or approximately 15 per cent. more current. This truck has much greater radius of movement than with the ordinary equipment, despite the fact that the battery is somewhat heavier.

It is sent to all parts of Greater New York and beyond, hauls of 25 to 30 miles not being infrequent, and it has made delivery at Glen Cove, L. I., 33 miles out, the round trip being 66 miles. The battery was not entirely exhausted when the truck reached the warehouse. While this was exceptional when contrasted with average truck work because of the distance, Superintendent Williams did not hesitate to send the truck, he knowing its capacity, but the trip would be regarded by many as being beyond the capacity of an electric machine. It was, however, a very satisfactory demonstration of what is possible with a vehicle equipped with a battery of large capacity. This machine, as will be noted from the accompanying illustration, has an express body with half panels and eight stanchions and a top rail on each side. The end gate drops from the ends of the top rail.

Two Forms of Body Equipment.

On this is placed the rack platform, which is covered with a mattress, and on which are carried the plates of glass. This platform is often removed and into the body is placed a rack with permanent side frames with a bottom in which are rows of sockets for uprights. On these uprights are arms that may be set for length and angle by set screws, and when the plates are placed against one row of uprights, for

instance, which have hooks at the top to prevent movement of the plates, the strain or pressure against the glass is equalized by setting the arms so that they all contact evenly against it.

The sides of the rack are about five feet height, and this is approximately the smallest dimension of plates. These racks are used for carrying uncrated glass. Usually paper serves to keep the plates from contact and scratching. These racks are similar to those used with horse vehicles, and, in fact, practically all the equipment is the same for both types of wagons.

Trucks Each More Than Equals Two Horse Vehicles.

The machines that are now in service are giving excellent satisfaction, being economical and, as estimated by Mr. Williams, each one is equal to two horse trucks for all purposes, but in the longer hauls they have much greater capacity. The same degree of economy may not be realized at each warehouse, because the conditions will differ somewhat, and in some instances the machines may be kept at garages, but the purpose is to have two batteries for each truck and to operate them on much the same plan as those directly under Mr. Williams' supervision.

The drivers are men who formerly drove horse trucks or wagons and are selected because of their dependability. They must have thorough knowledge of handling glass, for the plates carried are often very valuable and not infrequently a load may be worth in excess of \$1000, which might be practically destroyed by carelessness or failure to provide the necessary safeguards. The electric trucks can be handled so smoothly that there is practically no reason for damage, unless through accident that cannot be guarded against. Mr. Williams used a number of horse teams, wagons and trucks at the Manhattan warehouse, and similar equipment is in service at the other warehouses, but he maintains that from his experience the haulage and delivery will eventually be with electric trucks from every distributing station of the company. The company believes in standardization, and for that reason the equipment thus far, with one exception, has been Baker trucks. Other machines have been ordered and will be delivered in a short time, some before the end of the year.

Relative to operating costs, the conditions of operation preclude a statement that will be comparable with other services, but the economy at the Manhattan warehouse is decidedly satisfactory. There is every reason to believe that so far as practical the machines will be garaged in connection with the warehouses because of the comparatively small space required, and that the normal care and attention can be given at very little cost as compared with the average expense for garaging. The company experimented a much longer time than would be believed necessary, but the practical result of having accurate information is demonstrated by the purchasing of a considerable number of machines, and the prospect of numerous additional orders within the next year.

MAIN HIGHWAY CONSTRUCTION.

The attention of national, state and municipal authorities supervising or engaged in the construction and maintenance of highways has recently been directed to the necessity of building roads that will endure and can be maintained at minimum expense. Those who have studied the problem of road building realized that factors seldom considered must be dealt with in whatever improvement shall be made. One is the constant increase of traffic over all roads, another is the diversion of traffic from the poorer to the improved ways, a third is the combined wear of general vehicular travel, and the fourth is the necessity of maintenance to an entirely different standard.

The public that pays the cost of construction and maintenance does not, however, regard the saving that is made by improved roads. As a matter of fact there has been no reduction in cost of service where such highways exist so far as those who purchase transportation are concerned, but there is undoubtedly a decrease of cost for those owning and operating equipment. The highway systems of the nation and states are free and taxpayers assume that once a road is built it should endure indefinitely with little or no cost.

Highways are built by contract as a rule and state and municipal work is by no means as cheap as similar private construction would cost. Neither is it as enduring, and the expense of maintenance is relatively more. There may be exceptions to this general statement, but it will apply very well as a rule. Road development is in its infancy, so far as this country is concerned, and highway haulage will undoubtedly increase as its economy is realized. The cost may appear enormous when soberly considered, but highways will be the largest public work of the future. They represent at least a tangible investment and serve a useful purpose. The astounding expense of transportation over poor roads is forever lost. If the actual loss that is experienced annually through the condition of the highways could be transformed into a fund for improvement there would undoubtedly be a large surplus over all requirements wherever a main road exists.

GOOD RECORD OF WHITE TRUCK.

The following performance of a White truck, owned by William Morse of Leominster, Mass., will be of interest to users, present and prospective, of commercial vehicles. The figures are those of Myron W. Sarsfield of the Wachusett Cab and Auto Company, Fitchburg, Mass., by whom the record was made. The run was to Syracuse, N. Y., and return, and the engine is said to have run perfectly the entire distance, the details of fuel consumption, etc., being: Mileage, 700; gasoline consumed, 42 gallons; oil, two quarts; no tire trouble; average speed, 21 miles an hour. This is an average mileage of a little less than 16 a gallon.

TRUCKS DELIVER PAPERS ON TRAIN SCHEDULES.

Hotel and Railroad News Company of Boston, After Building Series of Vehicles and Many Experiments with Others, Adopts Two Standard Makes for Equipment.

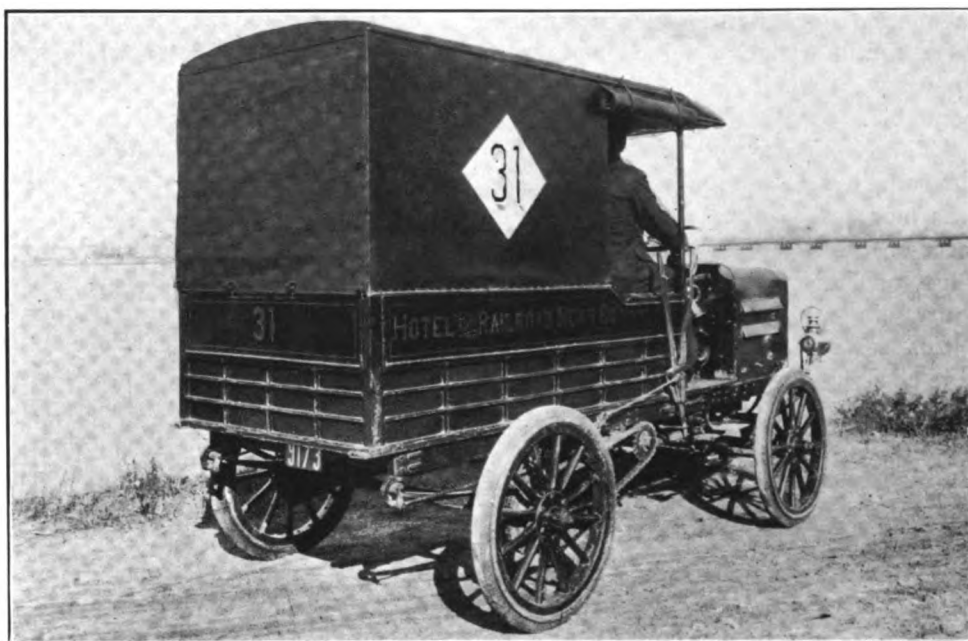
ANTICIPATING an industry, building its own motor vehicles, experimenting with many types of machines, and finally adopting two of well known manufacture as best meeting its requirements, is the remarkable experience of the Hotel and Railroad News Company, Boston, Mass., which distributes all of the daily newspapers of that city, save two afternoon publications. The first machine was built in 1897, so that the company has owned and operated motor wagons for 17 years. It did not engage in construction of machines as a commercial proposition, but to develop what the peculiar requirements of its transportation service demanded.

The company was the outgrowth of Brown's News Agency, which was founded by Hugh G. Brown, for the distribution of newspapers, and horses were used exclusively. In 1896 the news dealers of Dedham, Hyde Park and the southwestern section of Boston demanded early delivery of the morning papers instead of the uncertain service that had obtained until that time. Distribution was begun with a horse and a democrat wagon, but the long route and the fast time necessary caused Mr. Brown to turn to the mechanical vehicle as a probable solution.

Because of the successful operation of two-passenger vehicles built for Fiske Warren of Brookline, Mass., by the Holtzer-Cabot Electric Company, Mr. Brown decided that an electric wagon might be successfully used by him. He purchased materials and had his own mechanics build a machine that was completed in 1897, but because of the long run, the crudity of the battery and lack of knowledge of the electric vehicle, the expected results were not realized. After continued experiments to perfect the electric, he turned to gasoline engines, and built a wagon which was known as No. 31, which had a Brennan two-cylinder opposed 12-horsepower motor. So far as is known this was the first machine built in America exclusively for freight carrying. The motor was not sufficiently large and the loads carried were heavy, and there were the usual mishaps from untried construction.

One will note that the machine in a general way was well designed. The water cooled motor was located under a hood forward of the dash. The power was transmitted by jackshaft and side chains, and the brake was fitted to the rear wheels. The body was suspended on semi-elliptic springs, the frame being of wood. The body was a standard express type and the frame top was covered with rubberized cloth.

Learning the defects of this machine, Mr. Brown, after considerable experimentation, decided to build another gasoline machine, and this was equipped with a 50-horsepower Trebert engine. This was known as No. 5, and examination of the accompanying illustration will show that it was of a design that would to-



Wagon with Two-Cylinder Opposed 12-Horsepower Engine, Built in 1897, for Delivery of Morning Papers in Some of the Suburbs of Boston—This Was the Second Vehicle Constructed.

day be regarded as conventional. The water cooled motor was forward of the dash under a hood, the power was transmitted through a three-speed gearset and jackshaft and the drive was by side chains. The wooden chassis frame was mounted on semi-elliptic springs, and the wheels were fitted with solid tires. It was completed in 1902.

This machine was successful from an operative point of view, but it had an excess of power and again untried construction necessitated frequent repairs, so that the machine was not as dependable as was desired, although it was a decided progress as compared with the two previous vehicles. Mr. Brown was president and organizer of the Boston Auto Express Company, which began business in December, 1900,



Third Machine Built for Newspaper Delivery, Equipped with a 50-Horsepower Motor, a Special Construction Designed by Hugh G. Brown.

and which used electric wagons and Knox air cooled gasoline machines. While the No. 5 wagon was used on the Roxbury-Hyde Park-Dedham route, experiment was made with other machines. Motorcycles were found to lack load capacity and Orient buckboards were small powered and were by no means dependable.

The No. 5 was followed by another of practically the same design, although better constructed, and this was more satisfactory from every point of view, and later on the third and last machine, No. 26, was built. This, as had its predecessors, had a 50-horsepower, four-cylinder, water cooled motor, three forward speed ratios and reverse, and was driven by a jackshaft and side chains. No. 26 was much the better of the series, and was dependable and enduring. But like No. 5 and the first machine, it was blessed with too much power.

Meantime, the demands for suburban delivery were constantly increasing. Beginning about five years ago the New Haven railroad discontinued a number of early morning trains from Boston, which carried papers to suburban stations, and this necessitated other means of transportation, which the Hotel and Railroad News Company was expected to afford. With the increased number of routes and greater distances to be covered, earlier departures of the vehicles were necessary, and press and mailing room delays brought about the establishment of delivery schedules which were made as close as possible.

The company then experimented with converted pleasure vehicles, some of which were used until the present year, being discarded as their usefulness ceased. The routes

increased until there are now five that are served by motor wagons, each of 3000 pounds capacity. These leave Boston about 4:30 each day and cover from 22 to 40 miles, some of them averaging about 35 miles an hour until the deliveries are made.

The Roxbury-Hyde Park-Dedham route is through the southwestern section of the city, and at Dedham it connects with trolley cars that carry bundles of papers as far as Walpole, affording distribution through Westwood, Norwood and Walpole. This machine must make its schedule

or the deliveries will be delayed considerably. Ordinarily the start is made at 4:30, and the connection at Dedham is at 5:50, this giving an hour and 20 minutes for the run. Usually the route is covered with but two stops, the bundles being thrown from the machine as the driver slackens speed at the different stores. The round trip is approximately 29 miles. This is served with an Autocar.

The Grove Hall-Milton-Mattapan route is south from Newspaper row, and this differs from the preceding route in that it is not an express service, this making deliveries to the different news dealers and not being so closely confined to a schedule. The machine is an Autocar.

The route through the Metropolitan Parkway reaches Woburn, Montvale and Stoneham, serving news dealers direct. This has an average mileage of 28 miles. The vehicle regularly utilized is a White 3000-pound wagon.

That to Winchester, Melrose, Wakefield, Reading and Reading Highlands carries route bundles and



No. 26, the Fifth Special Vehicle, of 50 Horsepower, and the Last Built for the Work of the Hotel and Railroad News Company.

news dealers' orders, and this freight is carried by a White 3000-pound machine. The approximate distance is 40 miles.

All of these routes are served to contracts with the different newspapers, but a route that begins in East Boston and extends out along the North Shore to Winthrop and Revere, is the property of the company, and this is served practically the same as the others, but the transactions are with the company and not with the newspaper publishers. The service is maintained with an Autocar.

Newspapers are extremely perishable and unless delivered on time they are a loss to the publishers, to the dealers, and to the company handling them, and to maintain the market value, for the papers are sold generally because of the merit of the news they contain, they are all delivered by the company by the route wagons at the same time, this placing each publication upon a satisfactory competitive level. When the printing of any one of the papers is delayed the machines are held for it, so that the news dealers and their patrons are not inconvenienced.

But where the machines are operated with so small margins of time and there are possibilities of road delay, every precaution is necessary to insure against them. For instance, the White machines are used with pneumatic tires and demountable rims, so that a change can be made very quickly in the event of a puncture. The Autocars are driven with Overman solid tires, which equipment precludes delays from tire damage. The runs are made in comparatively short time, but this service is extremely important, and it completely justifies the purchase and maintenance of the machines.

That the motor vehicles are used for these suburban routes is possible from the fact that the papers are received from the mailing rooms wrapped in bundle form and marked. The distribution in the city, where the wagons are used, is entirely different, each wagon taking on a freight of loose papers. The helpers count each order, making up whatever a dealer may require as the vehicles are going along the route. Not only must each paper carried be counted, but the orders vary each day, and although expert in handling papers, the men cannot count accurately while being driven rapidly. Were the papers wrapped and the bundles sorted, delivery could be made by throwing the packages off as from the suburban route machines, but until the newspapers adopt bundling, the motor vehicles cannot be utilized to good advantage on the short routes.

Usually by 8 o'clock the drivers of the wagons and automobiles are all back from their routes. Work is then begun with the machines in distributing papers and magazines to the elevated railroad and subway stations that the company controls, and it is also agent for the distribution of publications in 10 different towns and cities. These must be hauled from the freight stations to the headquarters at 74 Franklin street and from there taken out to the news stands and dealers. This work is done by the motor vehicles, and the routes can be made of considerable length.

The afternoon delivery of the newspapers is not exclusively done by the company. The American and the Christian Science Monitor use their own vehicles. Here the motor wagons are again used, one route being on what is known as the "Bleachery Branch" of the Fitchburg railroad, going out to Waltham, the withdrawal of trains entailing a service for this section such as given for the morning routes. Another similar route is south through Dorchester, because of the lack of trains, while another delivery is exclusively of Transcripts through Brookline, and still another



White 3000-Pound Wagon That, with Full Load, Covers a 40-Mile Route Each Morning of the Year, the Schedule Requiring a Speed of 35 Miles an Hour During the Period of Delivery.

work is carrying Transcripts to the North and South railroad stations.

Between 8 o'clock and 2 each Thursday, Friday and Saturday, the machines are also worked distributing the packages of sections of the Sunday papers. Monday, Tuesday and Wednesday the machines are not as much in use, but generally they are worked 12 hours each day, the drivers having layoffs of varying lengths. Usually by 5 o'clock the work for the day is completed. With the horse wagons the men work early mornings and during the afternoon, but there is a limit to what the animals can do and the purpose is to relieve them so far as is practicable with the machines.

The company has a combination stable and garage at Tremont and Northampton streets, where the motor and animal vehicles are kept. In connection with this is a very complete maintenance division, for the

company builds its own wagons, makes its harness and repairs its automobiles. The policy of building and maintaining its equipment was established when horses were exclusively used, and the construction of a series of motor wagons developed a shop and facilities that are ample for a much larger number of machines.

If the company were to measure its motor vehicle service by the expense that has been incurred since the time of building the first electric wagon, the cost would undoubtedly be large, and yet, from the viewpoint of the peculiar needs of the business, the investment was well made. The company purchased its first White 3000-pound machine about two years ago. Six months later it bought a second White and its first Autocar, and since then it has acquired three more Autocars. The machines are given hard usage in the way of mileage, for Boston streets are notoriously bad, but they are well kept. The operating cost is not comparable with horse service, for the machines are a necessity and the delivery must be made no matter what the expense.

The fact obtains, however, that the motor wagons are generally required to operate on a train schedule, and in this exacting service they have proven to be extremely dependable. General Manager C. H. Sargent is proud of the fact that, despite the conditions of weather and numerous delays of the papers, the routes have been served without a break by the machines now in service. His long experience with automobiles, for he has been with the concern since he was a boy, has been a large factor in securing the efficiency he has developed.

PASSING OF THE FIRE HORSE.

Modern tendency toward the motorizing of fire apparatus spells the passing of the fire horse. Spectacular runs of the fire engines are constantly giving way to the quicker method of motor drawing, carrying in its wake the saving of many thousands of dollars each year from the resultant preservation of property because of the quicker control of the flames. The latest large city to see the passing of the horse is Buffalo, N. Y. Within the last month three battalion chiefs of that city's fire department were furnished with autos with which to speed to fires, and it is expected the other fire chiefs will have cars by Dec. 1. Chief B. J. McConnell has had a car for some time. The city is not buying any more horses for the chiefs nor for the drawing of the apparatus. There are now three auto engines and two auto trucks in the department, all bought within the past three years. The members of the department say the auto engines have demonstrated their efficiency over the horse drawn apparatus and no more bids will be asked for the old-fashioned steamers or trucks.

Pontiac, Ill., and Emporia, Kan., are also planning the purchase of motor apparatus.

ACTION EXPECTED ON FERRY CHARGES.

To secure official action on the claim that automobiles are discriminated against in connection with ferry charges, the traffic department of the National Automobile Chamber of Commerce announces that the matter will be taken up again within a short time, in conjunction with other automobile associations and the Merchants' Association of New York. When this subject was discussed before Dock Commissioner Smith in July, representatives of the manufacturers, dealers and users of trucks showed that discrimination exists on practically all municipal ferries and railroads, in the rates charged on self-propelling vehicles as compared with horse drawn vehicles. The railroads asked for time in which to give the matter consideration, check over their schedules and submit new tariffs for consideration. It was expected that this could be done within 60 days. Some delays were encountered, but the automobile and trucking interests are now hopeful of having the matter determined within a short time.

AUSTRALIAN IMPORTS DECREASE.

Australian imports of automobile and commercial car chassis decreased eight per cent. for the calendar year 1913, compared with 1912, the figures being \$6,489,722 and \$7,063,700 for the respective periods. With the single exception of Tasmania, which gained 32 per cent., every state shows a decrease in imports of chassis. There was also a decrease of about four per cent. in body imports, the figure for 1913 being \$1,052,793.

NEW ROLLER BEARING FACTORY.

The Hyatt Roller Bearing Company, Detroit, Mich., is erecting another factory in that city, which is to be 75 by 200 feet in size, six stories high, with basement. It is constructed of steel and concrete, and conforms in design with the group of other buildings already erected. Machinery is being installed in the lower floors while the top floor is being put on.

ADDS WHITE TRUCK TO FLEET.

The New Haven, Conn., branch of the Gulf Refining Company, has added another White truck to its fleet. This gives the White Company, Cleveland, O., a total of 40 in New Haven and over 80 in Connecticut. The Gulf Refining Company owns over 60 Whites.

Edward A. Kickhaefer of Milwaukee, Wis., has organized the Kickhaefer Manufacturing Company and established a shop for the production of dies and stampings.

TWO TYPES OF 500-POUND VOLTACAR CHASSIS.

DESIGNED to meet the requirements of those business men who must make quick delivery, having light loads and short hauls, the Voltacar has been developed by a company headed by A. H. Chadbourne, 1790 Broadway, New York City, and the intention is to produce the machine in considerable numbers. As the name implies the vehicle is driven by an electric storage battery and motor. The load capacity is approximately 500 pounds and the battery mileage is from 40 to 50 miles to the charge, the speed being from 14 to 15 miles an hour. The chassis differ slightly with the A and B models, but both have a wheelbase of 68 inches and tread of 40 inches, with overall length of from 102 to 112 inches.

The motor is No. 1031 size, built by the General Electric Company, rated at 28 volts, 40 amperes, with maximum of 1600 revolutions a minute. Normally the motor develops about $1\frac{1}{2}$ horsepower, but this can be increased by 200 per cent. for a period of 20 minutes.

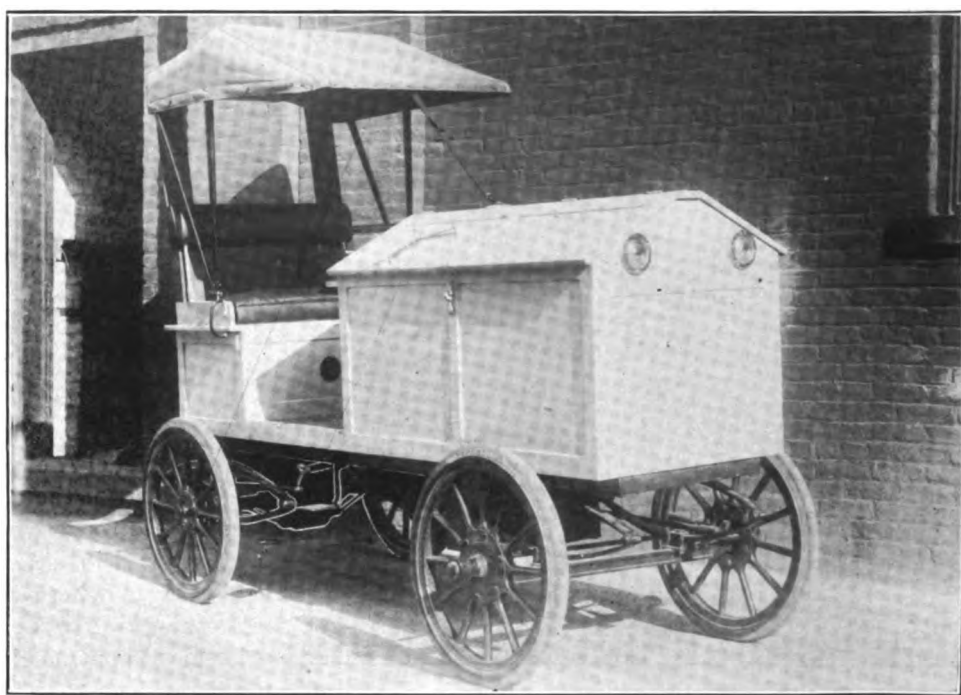
The chassis frame is built of pressed steel channel section, the members being large and well braced, on which a wooden deck is laid. Beneath the frame the motor is suspended, and from this the driving shaft extends to the rear axle. Bolted to the driving end of the motor is a steel fitting that carries the socket of a ball and socket joint, and in this socket is fitted the globe end of a steel torque tube. The tube is free to move in all directions in the socket. The rear end of the tube is bolted to the rear axle housing.

The rear axle is a semi-floating construction, there being a centre section that contains the differential, with end sections that carry the spring seats and the brake flanges. These sections are firmly bolted, with double truss rods extending from the ends beneath and supporting the centre section, so that there can be no abnormal stress upon the axle. The drive is by worm and gear wheel, the construction being that known as the David Brown type, which has been accepted as the standard of this form of power transmission.

The torque tube carries the driving shaft fully enclosed. A universal joint couples the driving shaft to the driving end of the motor armature shaft, and the driving shaft is mounted in roller bearings in the torque tube. The driving shaft is coupled to the worm shaft by a telescopic joint, which insures against end

thrust. In the David Brown construction the worm shaft is mounted above the worm wheel, and it is carried in high-grade annular ball bearings, there being provision for radial load and end thrust. The differential is a Ross product, and is built of high-grade material, with $3\frac{1}{2}$ per cent. nickel steel gears, carefully heat treated, and finely finished. The differential and the axle shaft bearings are an annular ball type of superior quality, and these are of load capacity far in excess of the practical possibilities of the vehicle.

The front axle is a drop forged steel I section of ample size, and the wheel spindles and pivots are fine steel drop forgings. The construction of the yokes is somewhat unusual to bring the centre of the pivot of the wheel spindle in the centre of the tread. Bring-



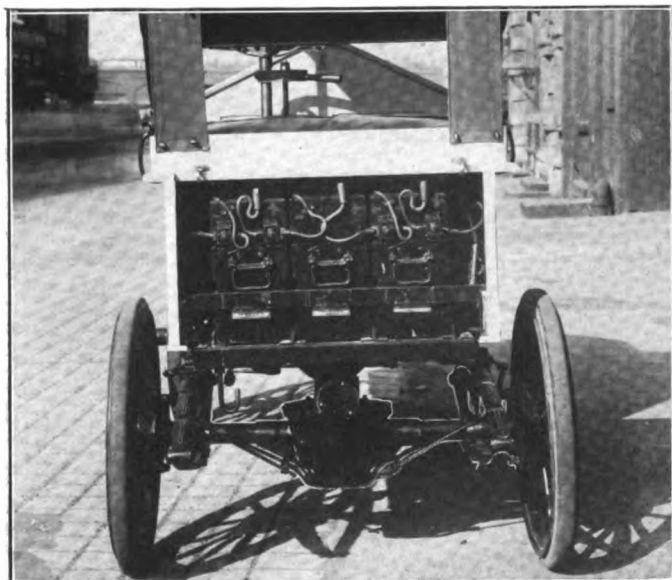
Model A Voltacar Chassis, Load Capacity 500 Pounds, Having Speed of 15 Miles and a Radius of from 40 to 50 Miles to a Battery Charge.

ing the line of support directly under the pivot minimizes the strain on the pivot and results in extreme ease of steering. This is accomplished by having narrower yokes and concaving the inside hub plates of the wheels, and the spindles are carried into somewhat longer hubs.

The chassis frame is carried on full elliptic springs of sufficient length to insure easy riding qualities, to protect delicate freight on rough roads or paving, and to justify the use of solid band rubber tires, this minimizing tire cost and delays from tire damage, and insuring practically continuous use of the vehicle. The rear springs are underslung to insure greatest suspension efficiency. The forward wheels are mounted on roller bearings, and, with the semi-floating rear axle fitted throughout with annular ball bearings, there is very little frictional loss. The driving thrust of the rear wheels is taken by the springs and by the sturdy

steel torque tube, a very satisfactory construction.

The reduction of the speed of the motor is obtained by the proportions of the worm shaft and gear wheel, this eliminating gears or any other reducing medium and insuring the largest degree of power efficiency at the rear wheels. As will be noted, the power transmission system is extremely simple. The controller is also a General Electric Company's product, this being a standard continuous torque type, which insures the starting of the machine by gradual, easy steps, when passing from series to multiple connection of the field coils of the motor. With the single motor equipment series-parallel is the standard form of control, resistance being used for the intermediate steps, with a sufficient number of notches to afford practical operating results. The General Electric controllers are a drum type, operated by a pinion and sector at one end, the sector being mounted on a countershaft carrying the operating handle or lever. The controller is mounted under the model A chassis, forward



Rear View of the Model A Voltacar Chassis, Showing the 12-Cell Battery Under the Driver's Seat and the Worm Driven Semi-Floating Rear Axle.

of the motor, in a water tight metal housing, so that it cannot be affected by any conditions that might obtain.

The controller is coupled so as to be operated by a lever on the steering wheel. The steering column is fixed vertical at the left side of the chassis. The steering gear is a Ross construction that affords an unusual degree of control. The brake is operated by a foot pedal so linked as to expand shoes carried within drums on the rear wheels. The wheels are fitted with 28 by two-inch tires, these being of a compound especially designed for electric vehicles, having high resiliency and endurance.

The other details of the vehicle differ according to the form of the body used. Model A carries on the forward end of the chassis a freight or carrying compartment, which is built with wooden frame and steel panels, with either side, forward end or top doors, and

this model is illustrated, the compartment having a top that lifts at either side. This has a capacity of about 25 cubic feet. In this model the two driving lamps are inset in the forward end of the body. At the rear end of the chassis is a smaller box for the battery, and on top of this is installed the cushioned seat, with lazy back, and also a folding fabric top that is held by a strap carried forward to the top of the carrying compartment.

The forward side of this battery box is ventilated. The rear side is a removable panel, and when this is taken out the battery crates can be drawn out in their channels after a bar that retains them has been removed. The battery consists of 12 cells with 11 or 13 plate elements, if of the lead type, or 24 Edison A-4 cells. The crates are a size that can be easily lifted by a boy and an exchange of battery can be made in a very brief time. These crates may be either three, four or six-cell capacity, according to the make of cell.

With the model B body conventional practise is followed, in that a dash is fixed at the forward end of the chassis, with the steering column and brake between the dash and the driver's seat. The carrying compartment is increased to have a capacity of approximately 50 cubic feet, or double that of model A, this making practical a much bulkier load. These bodies have rear end doors and, to have the full benefit of weight over the rear wheels, the battery crates are carried at either side of the body in compartments that are fully ventilated. The controller with the model B chassis is carried in the compartment beneath the driver's seat, this affording the same protection as with the model A chassis.

The plan of the company is to sell these machines complete to those who desire them, to sell them without batteries in different sections of cities and establish garages where the machines may be maintained and battery service provided for a stated monthly price, or to contract for service with uniformed drivers for a fixed cost. The life of the electric machine is known to be from six to 12 years or more, according to the use and attention, and basing expectations on definite knowledge, the actual depreciation will probably not exceed 10 per cent. The cost of battery charging for these machines, will, of course, depend upon the local power rate, but where the batteries can be charged in series the cost of a full charge will probably be 15 cents as a minimum and 25 cents as a maximum. In other words, the cost of current may be roughly approximated as from a third to a half-cent a mile. A second battery would mean a very small additional investment and would insure practically double the rated mileage.

The details of the company's operations are now being developed, and the ultimate plan is to operate in many cities, for the belief is that the endurance and simplicity of the Voltacar, with its extreme economy and utility, ought to be recognized by the class who have use for a small, light, really serviceable electric vehicle.

BAKER BRINGS OUT A FIVE-TON TRUCK.

THE Baker Motor Vehicle Company, Cleveland, O., has added to its line a five-ton truck listed as model EA, making in all five sizes, from 1½ to five tons, and covering the commercial vehicle field very completely.

The increasing requirements in the brewery, milling, contracting and other trades, which constantly handle heavy loads over a small radius of city streets, have been met by this new vehicle, which is particularly designed for service under these conditions, not only in this country, but also abroad, sales arrangements having been made which, it is anticipated, will place the Baker line in the foreign field.

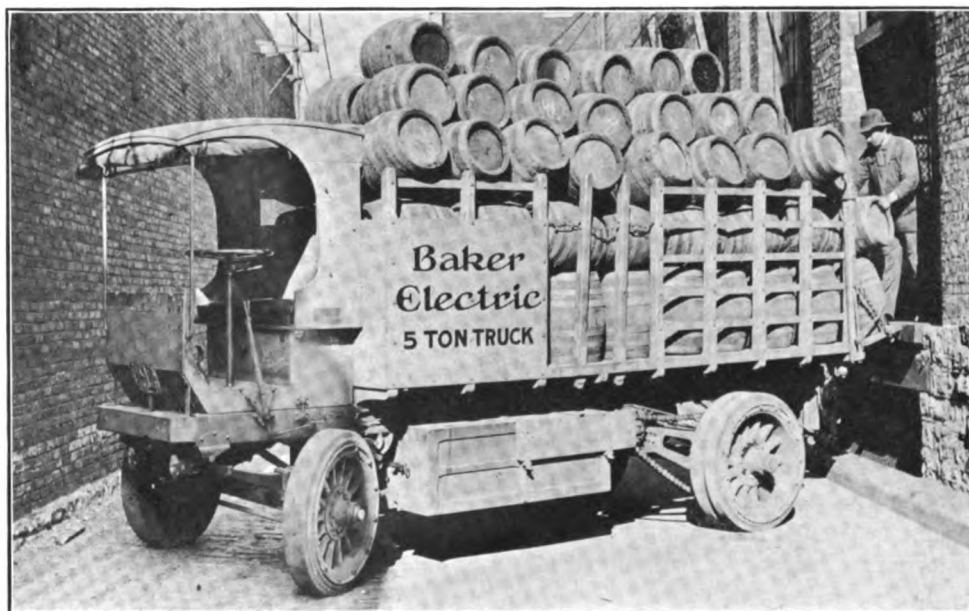
The general design of the model EA conforms to standard practise and is similar to that of the other Baker vehicles, embodying the well known features of side dismounting battery, single large motor drive to the countershaft with silent chain reduction, and final drive to the rear wheels through a roller chain from the countershaft. None of the refinements of the smaller models has been omitted in the production of a truck sufficiently sturdy to handle the rated load, and the massive appearance is not an indication of a lack of flexibility.

The chassis is built up with a pressed steel frame, strongly braced, the side members being seven inches deep and three inches wide, rolled from ¼-inch stock. The wheelbase is 137 inches, the tread is 72 inches and the wheels are of the patented Schwartz construction with dove tailed interlocking spokes which, in the rear wheels, are four inches in width. Solid rubber tires of improved electric compound, 36 by seven-inch single in front and 38 by five, dual, on the rear wheels, are the standard equipment. The rear axle is a one-piece square drop forging, with spindles 3¼ inches in diameter, while the front axle is a one-piece drop forging of I beam section, the rear wheel and axle being particularly heavy to resist the destructive strains which result from skidding. Semi-elliptical springs are used both front and rear, the ends and supporting brackets, riveted to the frame, being bronze bushed, and the shackle bolts hardened and ground, and provided with grease channels for the passage of lubricant from the compression grease cups.

Lead or Edison batteries will be furnished as the customer may prefer, either type being mounted in six trays, easily removable from the battery compartment,

should the necessity arise, although adequate means are provided for charging and care without displacement. The approximate ampere-hour capacity of the 42-cell lead batteries usually supplied, several makes and styles of which are listed, is 300, which, with the approximate current draft with full load of 6½ amperes a mile, permits a safe mileage a charge of 40 miles at seven miles an hour. The Edison equipment consists of 60 cells with a rated capacity of 450 ampere-hours, the higher current draft, caused by the difference in voltage, resulting in about the same practical performance as with the lead type.

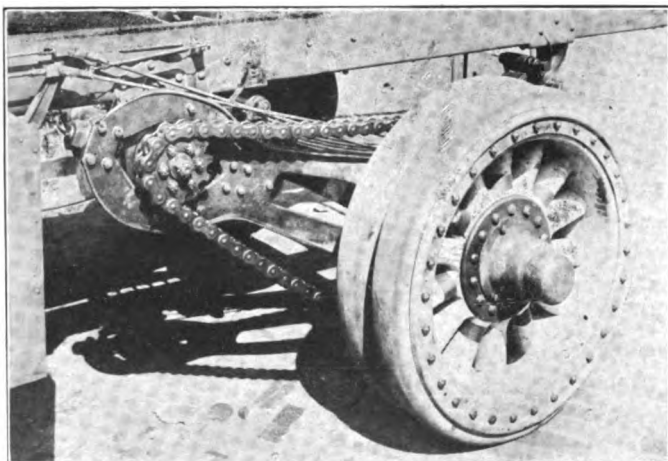
The controller is the horizontal drum type, giving five speeds forward and three reverse, and mounted in a cast aluminum casing supported on the chassis frame directly under a removable footboard in the body. Fuses, resistance box and signalling device are installed in a separate aluminum case near the con-



An Example of the Heavy Service for Which the Baker Five-Ton Truck Has Been Especially Designed.

troller, where they are protected from dust and dirt, yet readily accessible. Especially in the case of the controller is this construction of the highest importance, for failure to keep the contact surfaces clean is certain to result in corrosion, through arcing between the controller fingers and contact bars. The running switch, which closes the circuit for running purposes, is mounted in the heel board and so constructed that it cannot be removed when the circuit is closed. It is of the blade type and enclosed in an aluminum case. The charging circuit is independent of the running circuit, avoiding the danger of starting the car by the accidental movement of the controller handle while the batteries are being charged. The control lever is mounted on the steering column convenient to hands of driver, and operation is by a rotating sleeve actuating a controller drum through a sprocket and chain.

The wiring system is carefully worked out to insure long life, a clear Para rubber insulation being used, and the wires are mounted inside the left hand



The Massive Distance Rod of the Baker Truck, Illustrating Chain Adjustment and Attachment of Front Sprocket.

frame, where full protection is given without obstruction of free air circulation.

The single large General Electric motor is completely enclosed and carried on a transverse member of steel tubing mounted on the chassis frame, bronze hangers being used to avoid the possibility of rusted or sticking joints interfering with oscillation for the chain adjustment. The armature is mounted on ball bearings, and the drive to the countershaft is through a Renold silent chain running in an oil bath contained in the gasketed, aluminum case, a construction which will materially add to the life of the car. Means are provided to direct the oil to the differential, and away from the motor.

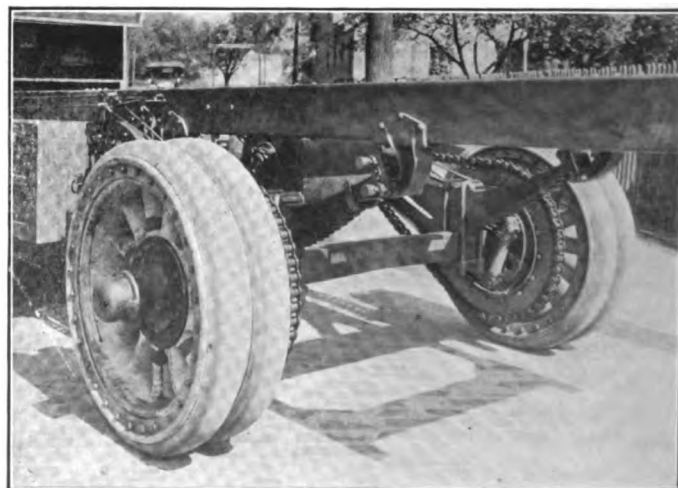
The countershaft axles are also enclosed, and are mounted on annular ball bearings. The sprocket is dowel bolted to the hub, which in turn is secured to the squared ends of the alloy steel countershaft axle. These sprockets are reversible, giving double wear, and are forged and hardened, instead of being cast as is usual. The method of attachment is such as to permit removal and replacement at a minimum cost, as will be seen from the illustration which shows the front sprocket installation. The chain adjusting and distance rod mechanism, depicted in the same cut, as well as in the rear view of chassis, is of heavy cast steel of ample strength to take all braking and driving strains, the rear end being mounted on the rear axle by a hinged joint and the forward end on a ball and socket support. Adjustment is by a single large nut shown at the front end of the distance rod, locked by smaller nuts. This flexible mounting, together with the hinged joints of the countershaft, prevents the cramping of the distance rod through side strains or distortion of the frame on rough roads.

Two sets of internal expanding brakes operating on the rear wheel drums are provided, either of which is ample to hold the loaded truck under all road conditions, as is shown by factory tests on the 14½ per cent. grade included in the testing course.

The emergency brake is hand controlled with a ratchet, and the service brake is applied by a foot lever without a ratchet. The steering gear consists of a spur gear chain mounted in a housing and packed with grease, the ratio being such that the driver can easily turn the fully loaded truck around a sharp corner, even on the roughest street, less than one revolution of the steering wheel being required. This results, in a great degree, from the installation of Timken ball bearings in the steering knuckle, which take the thrust due to the weight of vehicle and load supported on the front axle, and permit much easier turning than would be possible with plain bearing surfaces.

The chassis frame is furnished in three lengths, the largest giving a loading space of 15 feet back of the driver's seat. The weight, with the standard lead batteries, is approximately 9500 pounds and, with the body and load, something over 10 tons, which is not excessive when the capacity of five tons with a 50 per cent. margin of safety is considered. The turning radius is 35 feet. Bodies are furnished to meet the requirements of the purchaser, and at a cost depending upon the particular type which may be installed.

It will be seen that the whole design has been carried out with the idea of giving the greatest possible flexibility consistent with the character of the service to be performed, and without the elimination of those features and refinements which contribute to efficiency and economical use. The power plant and driving mechanism have been worked out to this end and, notwithstanding the size of the vehicle, it will be found to give a service which very closely approaches in convenience and rapidity that of trucks of much smaller capacity. With the alternative gearing which may be applied, a speed up to eight miles an hour can be attained under proper conditions, and provision has been made for



Rear View of Baker Truck, Showing Spring Suspension, Rear Sprocket, and Attachment of Distance Rod.

extra battery equipment when this higher speed or exceptionally long mileage make a capacity greater than normal necessary or convenient.

CHARGING APPARATUS FOR PRIVATE GARAGES.

By J. F. Lincoln.

AMONG the papers presented at the fifth annual convention of the Electric Vehicle Association of America, held at Philadelphia, Penn., Oct. 19-21, was that prepared by J. F. Lincoln, president of the Lincoln Electric Company of Cleveland, O. This dealt with "Charging Apparatus for the Private Garage", and considered at length some of the aspects relative to charging with varying equipment, and described generally the Lincoln charger, which is a type of mechanical rectifier or converter that is controlled by the author. The paper follows:

In presenting this paper, the writer recognizes the fact that there may be some statements made which will be questioned by the manufacturers of charging apparatus of a different design than those described. For that reason the writer will in all cases give definite data which can be checked up accurately and nothing will be said intentionally which can be justly translated into a "knock" as "knocking" is generally defined.

The importance of properly charging the battery used in pleasure vehicles cannot be overestimated. The mere fact that the difference between proper and improper charging of the battery will make the difference between a total mileage life of over 15,000 and any fraction of this makes this fact easily appreciated. The actual results which are gotten by the usual method of charging at present I think we will all admit are not perfect.

The reasons for this are the charging requirements of the lead battery, which require a definite cycle of operations to properly and completely charge it, and also on account of the fact that most charging is done at night, when no attendance is possible, making it necessary to have automatic devices to take care of the cycle of operations mentioned above. The characteristics of the battery as affects its charging are the following:

First, all lead batteries, when charged above a certain rate, called the gassing rate, will tend to throw down to the bottom of the jar active material, thus reducing its total life in the same proportion that this throwing down goes on. This gassing occurs only at extremely high rates when the battery is discharged and at rapidly reduced rates as the charge goes on until when the battery is fully charged it will occur at very low values of charging current. This means that the successful charging plant must automatically give a tapering charge in order to eliminate excessive gassing.

The second feature, which must be very carefully watched, and which may result in rapid depreciation of the battery, is heating during charge. If the temperature of the battery runs up above 110 degrees Fahrenheit the plates soften. This results in deterioration of the battery which, if continued, will materially shorten its life.

The third difficulty as mentioned above is the fact that charging must generally be done at night, and in the private garage; therefore, it must be done by apparatus which will automatically give the required cycle of charging rates. It is not only necessary that the charge should be tapered or stopped automatically, but the charging set must do this without any possibility of harming the battery, no matter what accidents may occur.

The fourth handicap that the battery is working under in the usual private garage is the fact that the attendant is generally both unskilled and apt to disregard instructions or translate them improperly.

Because of these difficulties the charging apparatus must have a great many automatic features in order to successfully give the battery the proper tapering charge and always keep it below the excessive gassing rate and at the same time do this without the necessity of any attention. Up to the present time I think all admit that a charger which will automatically perform this cycle of operations without attention has not been in common use.

An Estimate of the Mercury Arc Rectifier.

The apparatus which has frequently been used for charging in the private garage is the mercury arc rectifier. This instrument depends for its converting properties on the valve like action of a glass tube with the proper electrode which allows current from an alternating current source to flow in one direction only. This instrument has been carefully developed by two of the largest electrical manufacturing concerns in the country, is of neat appearance, of high efficiency and except for the fact that its voltage and current characteristics are not best suited to the charging of lead batteries has considerable application. The difficulties with this instrument in connection with the charging in the private garage are the following:

It depends for its cut off, that is, the termination of the

charge, on the rising of the battery voltage to equal the line voltage. This makes the cut off dependent not only on the battery voltage which, as I will show later, cannot be safely relied upon as a means of cut off, but it also makes the termination of the charge dependent upon the fluctuation of the line voltage. This means that a rising of the line voltage after the battery is put on charge will result in an overcharged and damaged battery, while a lowering of the line voltage will result in a battery only partially charged, which will finally sulphate, besides inconveniencing the user. When we remember that voltage fluctuation above and below a mean point sufficient to cause either of these contingencies is very frequent, particularly on long lines, it is easy to see why this method of cut off cannot be made dependable. This limitation of the rectifier is so well understood that it is very seldom that the voltage cut off is depended upon for giving the battery a complete charge without attention. Generally the battery is put on at a rate which will make it certain that it will cut off before a complete charge is put in and the charge is completed some time when the battery can be carefully watched.

The glass tube of the rectifier deteriorates with use and must be periodically renewed. The guarantee of 300 hours use put on these tubes by the manufacturers will give some idea as to their life, and this source of expense has a very appreciable bearing on the total cost of charging.

The rectifier cannot be used with the usual size of pleasure car battery at the rates at which the charge should be finished or at which the overcharging should be given. A rate of 10 or 12 amperes is the lowest stable rate which the tube will maintain under the usual voltage conditions as found in usual residence districts. This rate is altogether too high for the finishing of the charge and results in injurious gassing to the battery each time a charge is completed.

There are other devices on the market, notably a rotary converter of very ingenious design and also motor generator sets of good construction and design, both of which, however, depend on the same features for cut off as the rectifier, that is, the increasing of the battery voltage.

Conditions Governing Battery Voltage.

Since the battery voltage is dependent upon a number of various phenomena, among which are the age of the battery, temperature, condition of the plates as regards sulphate, specific gravity of the various cells, short circuited cells or partially short circuited cells and drop in the charging lines, it is quite evident that any device which depends on voltage for cut off cannot be made reliable. When it is also remembered that very often battery voltage will rise to its maximum point before the battery is completely charged, and under extreme conditions will even rise above its maximum charged voltage before 10 per cent. of the charge is put in, it is easy to understand why difficulties with this scheme are frequent.

Specific gravity of the electrolyte is the most reliable method of determining the condition of the charge of lead cells.

When we also take into consideration the fact that a battery may be ruined in a comparatively short time by improper charging, so that its life will be cut down to a fraction of what it would be under proper conditions, it is easy to see why these automatic devices dependent on battery voltage, which, when properly handled, are beautiful in their action, yet when improperly handled, as they are very apt to be in the usual private garage, become a positive menace.

The Ideal Charging Equipment.

Let us consider what the ideal charging plant for the private garage would be:

First, it is essential that the plant put into the private garage first of all should not require attention. I say that advisedly from my experience with probably 3000 or 4000 privately charged batteries and their operation. It is a fact that as a general thing if there is anything to be done by the operator of the private garage it will be done wrong some time.

Second, the plant also must be of such a construction that no matter how long the battery is left without attention the plant will not damage the battery.

Third, the charger must be of such a type that it will put in a complete charge without any attention and do this within the time which is usually given over to charging, so that the car may be completely charged when next required.

Fourth, it must be able to charge the battery throughout the complete charge and overcharge without harmful gassing. I think that the battery manufacturers have enlarged on this point, so that the mere statement of this fact is accepted without question. There is not the slightest doubt that gassing, particularly violent gassing, is probably the most harmful thing which is usually done to a lead battery.

Fifth, the battery also must without attention be fully charged and the temperature of the battery must not rise above 110 degrees Fahrenheit. This often becomes a difficult matter in warm places, especially after the battery has been used immediately before it is put on charge.

Sixth, there must be no depreciation of the charging apparatus which will necessitate the replacing of the parts of it, or if such replacements are necessary they must be at very long intervals and must be of such a nature that they may be made by the usual electrician without much cost to the owner and without delay.

Seventh, the cost of the plant must be small.

Eighth, overcharging with the charging apparatus should be automatic and should be complete enough so as to eliminate the possibility of the plates sulphating.

Ninth, the efficiency of the output, that is, the charging cost, all features being taken into consideration, should be high enough so as to make the burden of charging current cost as small as possible.

We have now described what I believe all will agree would be an ideal charging plant. I will now describe the outfit which I believe comes closer to fulfilling these requirements than anything else which has been put on the market.

Characteristics of the Lincoln Charger.

The Lincoln electric charger is a motor generator set made two bearing, the two bearings being self-aligning SKF ball bearings of ample size. The set itself is extremely compact and light in weight, has been designed particularly for efficiency and power factor, both of which characteristics are unusually high for the size of the machines. The set operates at 1800 rpm for 60-cycle supply and 1500 rpm for 25-cycle supply. The motor is a single-phase, non-starting induction motor, with a very low resistance squirrel cage winding. The generator is a two-pole interpolar machine compound wound, with a characteristic which approaches as closely as is possible, for the size of the machine and work to be done, a constant voltage generator. There is furnished with this outfit and wired to it, a steel cabinet, in which is mounted a standard knife switch with a number of special jaws for complete control of the apparatus and so arranged that the following sequence of events takes place as the switch is closed:

First, the shunt field is closed from the battery, thus exciting the shunt field fully. The second contact is a short circuit on the series field and the closing of the armature circuit across the battery. This allows the set to run up to practically synchronous speed, the generator acting as a motor supplied by current from the battery. The third contact is the closing of the motor leads to the alternating current supply. The fourth contact opens the short circuit on the series field. All of these contacts are made by merely closing the four-pole switch mentioned.

These sets are sent out with all wiring between the switch box and set completely in place. All that is necessary to do in installing the outfit is to screw the cabinet to the wall and connect the two leads from the a. c. supply line into two lugs in the switch box and connect the charging plug to the charging cable, which is furnished and connected properly. The set then is ready for operation. By a special construction of the outfit it is impossible to connect the charging plug wrong, no matter how it is attached or if it is connected in and then taken off and reversed the set will still operate satisfactorily and the series field will still remain connected in the proper direction.

Some Operating Features.

The characteristics of this outfit are as follows:

Because of the special construction of the magnetic circuit and on account of the compound winding, the starting rate is up to the maximum capacity of the set, on a totally discharged battery. As the charge goes on, the counter electromotive force of the battery rises, thus decreasing the charging rate. This, however, after the first hour comes to a nearly constant rate and a very large part of the charge will be put in at a rate of approximately $1\frac{1}{2}$ amperes per plate. In other words, on a 13-plate battery the most of the charge will be put in at a practically constant rate between 20 and 17 amperes. When approximately 85 per cent. of the charge is put into the battery, this rate begins to rapidly decrease as the battery voltage again starts to rise rapidly, and when the battery is completely charged, this rate will drop to less than one-half ampere per plate, or in the same 13-plate battery mentioned above, approximately six amperes. If the charge is continued beyond this point, this same six amperes or less will continue to flow into the battery until it is manually cut off.

A full battery charge takes approximately 12 hours. It is seldom that a full charge is needed, as some of the previous charge is usually left in the battery, when it is again put on charge. However, no matter if the battery is left on charge for any reasonable length of time after it is completely charged, it will not be damaged by the very low rate mentioned. This low finishing rate has another advantage: it converts any sulphate which may be present on the plates.

The charger is so arranged that in case of short circuit, open circuit, grounded circuit or failure of the line voltage, it automatically takes care of itself.

Constant Operation Without Adjustment.

From the description of this machine and from the description of its operation, it is evident that there is nothing automatic which must be adjusted nor are there any adjustments necessary for the use of this machine in actual service. There is no reason why this set cannot be put into service and remain in service for years without the necessity of adjustments or repairs with the one possible exception that once a year the grease in the bearings should be changed and there may be the necessity of a new set of brushes at the same time.

There are no accidents which can occur which will make it possible for destructive overcharging to take place, as is the case with a tube rectifier where a rise of voltage on the supply line may result in the heating of the battery, or where a drop of voltage in the supply line will result in an incomplete or practically no charge of the battery.

Now let us consider the point which really in the last analysis determines the relative values of this or any other charging instruments, that is, the total cost of charging, including current cost, depreciation of the charger and depreciation of the battery caused by the charger.

There is not the slightest doubt that if the apparatus described will do certain work for less money than any other apparatus, all things being considered, it is the one which should be used, and is superior to other apparatus for the same purpose.

The cost of charging is made up of three items:

First, cost of current.

Second, depreciation of the charging plant.

Third, battery depreciation caused by charging.

To get the total cost of charging, let us assume a standard equipment as follows:

Battery to be 40 cells, 13-plate.

Average miles per charge, 80.

Ampere-hours input for full charge, 180.

Battery cost, \$250.

Cost of current, four cents per kilowatt-hour.

Current Cost and Efficiency.

First, let us consider the current cost for charging this equipment with the rectifier, and also with the Lincoln electric charger. The electrical efficiency of the Lincoln electric charger is about 10 per cent. less than is the efficiency of the rectifier. This will make the cost of a complete charge on the above equipment 86 cents with the mercury arc rectifier, and 96 cents with the Lincoln electric charger, or a cost per mile of \$0.0108 as compared with \$0.012 per mile.

Second, the depreciation of the charging plant:

It is evident from the description of the Lincoln electric charger that the depreciation will be extremely small. Five per cent. a year will cover this without doubt, which amount is negligible; in fact, the depreciation of the rectifier outside of the tube would be equally as great, if not greater. The tube depreciation of the rectifier would be seven cents per hour, taking the present day guarantee as to tube life and cost as a basis. This amounts to approximately 52 cents per charge, or 0.0066 cents per mile.

Third, the deciding factor, however, is not the cost of current or the depreciation of the charging equipment, but is the battery depreciation which, in comparison with the other two items, is large enough to almost disregard them.

A battery charged with the rectifier under usual conditions must finish at a rate of from 10 to 12 amperes unless closely watched, as this is the lowest stable rate which can be maintained under average conditions of voltage regulation in the usual residence section. Close watching, of course, at night is impossible, therefore, this is the finishing rate which is actually used by all rectified charged batteries. This rate will badly gas the usual size of pleasure vehicle battery when fully charged and will shorten its life on this account. In warm weather, it is impossible to complete the charge of a lead battery at these rates without overheating it and softening the plates, besides causing the deterioration spoken of on account of gassing. Because of these facts, the average life of the rectifier charged battery will not average in excess of 7500 miles. This is the result of data compiled from the life records of several hundred rectifier charged batteries. The average life of a battery charged on a non-gassing and non-heating schedule will be at least 15,000 miles, as shown by life records of batteries charged under these conditions. Any battery manufacturer, I am told, would be willing to guarantee such a life record providing the user can guarantee to him that the battery will never be gassed under charge nor the temperature rise above the specified limits.

Cost of Battery Depreciation.

With these facts as a basis, the average depreciation of the battery on a basis of 7500 miles is $3\frac{1}{3}$ cents per mile. With 15,000 miles as a basis, the battery depreciation becomes 1.7 cents per mile. Taking all costs, therefore, together, the cost of charging by the use of the rectifier becomes approximately 5.1 cents per mile as compared with the electric charger cost of 2.87 cents per mile.

It may be interesting to give the experience of the writer with his own electric car in connection with charging: I have been driving for three years a model 18 Detroit roadster, equipped with 24 cells of 11-plate Philadelphia battery. During the first year I had accidents which have resulted in broken jars, and at that time I had the battery pretty carefully looked after, as each time a new jar was put in by the person who made the replacement, the gravity of the cells was evened up. However, in the last two years the gravity of these cells has not been taken and they have received no attention outside of the charging which was necessary. I am at the present time getting about 75 per cent. of the mileage which I got the first year at the maximum point. I have driven this car over 11,000 miles and, as already stated, the battery has had no attention, although I believe that the time is approaching when I ought to have the battery washed. There is not the slightest doubt that the mileage life of this battery will be in excess of 15,000 miles, and there is also no doubt in my mind that the reason for this is the fact that the battery has never been warm under charge and has also never gassed under charge.

A neighbor of mine who has a car of the same make with the same size of battery, although in a different model, has made his first replacement at the end of 6250 miles, and will very shortly have to make his second replacement of his battery. This is being charged by a different type of apparatus, and in a great many cases at least, has gotten dangerously hot and also always finishes at a badly gassing rate. While the two cases sighted do not make a law, I think there is no doubt that the difference in mileage is the result between proper and improper charging. I also believe that any battery manufacturer would be willing to make guarantees of mileage equal to the one that I am getting if he was assured that no gassing nor heating would occur during charging.

FIRE CHIEFS WITNESS TEST OF APPARATUS.

THE 42nd annual convention of the International Association of Fire Engineers, held at New Orleans, La., Oct. 20-23, saw five pieces of motor pumping apparatus put through a 12-hour test. These trials were held on Oct. 21, and four manufacturers had their pumps lined up at the new Basin Canal bank, where the tests were conducted. These were the Robinson Fire Apparatus Manufacturing Company, St. Louis, Mo., the Ahrens-Fox Fire Engine Company, Cincinnati, O., the Seagrave Company, Columbus, O., and the American-La France Fire Engine Company, Elmira, N. Y., the last named having two pieces of apparatus entered.

In addition to the pumping tests, an exhibit was held in the Washington Artillery hall, but fewer machines were shown than has been the case at past conventions. The concerns noted above, with the exception of the Robinson Company, were represented at the show. In addition to these were the Knox Motors Company, Springfield, Mass., the Goodyear Tire & Rubber Company, Akron, O., and the Firestone Tire & Rubber Company, Akron, O.

In the test several perfect scores were made, and one of these was by the Robinson Fire Apparatus Company. It should be pointed out that, during the entire trial, the engine was not touched once by the operator; neither was there any adjustment made during that period. E. T. Robinson, president of the company, says that it is not uncommon for its engines to be left pumping at fires for extended periods without any attention.

The Robinson combination pump and hose wagon has a rated capacity of 900 gallons a minute at 120 pounds pressure, 500 gallons at 200 pounds pressure and 350 gallons at 250 pounds pressure. In a three-hour test it discharged an average of 920 gallons at 120 pounds pressure; in a 1½-hour test 542 gallons at 204 pounds, and in another 1½-hour test pumped 356 gallons at 251 pounds pressure. The actual displacement a revolution was 3.172, 3.207 and 3.209 gallons respectively for the three tests. The amount of gasoline consumed for the three tests totalled 65 gallons.

The Ahrens-Fox combination pump and hose wagon, model K-2, had a rated capacity of 600 gallons at 120 pounds pressure, 325 gallons at 200 pounds and 275 gallons at 250 pounds. In the three-hour test this machine discharged 622 gallons a minute at 129 pounds, and in the two 1½-hour tests discharged 331

gallons at 222 pounds and 286 at 271. The amount of gasoline used was 42½ gallons.

The Seagrave model S combination pump and hose wagon was rated at 1000 gallons at 120 pounds, 700 gallons at 200 pounds and 600 gallons at 250 pounds. In the three-hour test the actual running time of which was two hours and 40 minutes, the car discharged 1014 gallons at an average pump pressure of 132 pounds. At the beginning of this test the clutch could not be thrown into locked position. The clutch slipped at times for the first 1½ hours, during which period the engine was stopped for three minutes, two attempts being made to tighten the clutch. The engine was shut off for 17 minutes and the driving and driven members of the clutch were bolted together for the remainder of test. In the second and third tests, of 1½ hours each, the machine discharged 744 gallons at 219 pounds and 630 gallons at 255 pounds.



The Robinson Combination Pump and Hose Wagon, Which Finished with a Perfect Score at the New Orleans 12-Hour Pumping Tests.

The American-La France Company had two pieces of apparatus, a No. 12 combination pump and hose and a No. 19 combination. The first had a rating of 700 gallons at 120, 350 gallons at 200 and 325 gallons at 250 pounds. The second machine was rated at 1000 at 120, 500 at 200 and 425 gallons at 250 pounds. The results of the tests follow: Three-hour, No. 12, 716 gallons at 120, and No. 19, 1022 gallons at 118 pounds pressure. For the 1½-hour trials the former did 368 and 336 gallons at 208 and 273 pounds respectively. No. 19 accomplished 534 gallons and 452 gallons at 211 and 267 pounds respectively. In the three-hour test of No. 12, dirt in the gasoline caused misfiring for the first 15 minutes. This resulted in a drop in the pump pressure to an average of about 100 pounds and at times to 40 pounds.

The expert committee examined the motors after the test and reported that they were all in excellent condition. In ordinary service fire apparatus is not put to such a severe test.

AMERICAN TRUCKS IN DEMAND ABROAD.

A CONSERVATIVE estimate places the number of trucks exported by American manufacturers to the belligerent nations during the month of October

were shipped to Greece, and 300 Overlands were exported to Belgium. This makes a total of 3758 for the month, so far as known at the present moment. For the entire year of 1913 there were only 784 American trucks exported to all the countries of the world.

Just what selling to a nation at war means to the manufacturer is something that is not appreciated at first glance. When sold through the regular channels the manufacturer must stand the expense of the sales organization, advertising, branches, service station, etc. In addition to this, he must allow for the guarantee of replacements, which he stands ready to make good on during the early months of the truck's service. Taking conditions on



One of the Jeffery 1½-Ton Army Trucks as It Appears Fully Equipped for Service.

an average, \$150 would not be an unfair figure to allow for the expense of each truck for all of the above items.

However, when the manufacturer sells to a warring nation he is free from any of the above charges. The trucks are taken over by the foreign country's representatives on the wharf and the cash is paid then and there. The company is then released from any further responsibility. Should the truck be captured on the way across the ocean, or arrives at its destination safely and breaks down the first day, it makes no difference to the maker. Consequently, it is seen that the American manufacturer sells to the foreign governments without service, guarantees, replacements, etc. This means that, in addition to the ordinary profit, he makes an additional \$150 on his sale. Applying this, we find that the companies, whose sales are known, have made approximately the following extra

at approximately 3750. The official announcement, made by the office of the secretary of state, that trucks may be shipped to the warring nations without violating the neutrality of the United States, has had a reassuring effect on the American manufacturer. This statement, published elsewhere in this issue, clarified the air, and was immediately followed by large orders from abroad.

Just what this war will mean to the American truck maker is clearly illustrated in the government's figures of the September exports, which show an increase of 266 per cent. in commercial vehicles, this, too, being before the heavy buying commenced. The October sales to foreign nations, as accurately as can be stated at the present time, included 1000 Autocars for Great Britain. This, as far as known, is the only order for that country. France is reported as taking 2928 American trucks, divided as follows: 750 Whites, 340 Kellys, 338 Packards, 200 Pierce-Arrows, 150 Jefferys and 150 Reos. Next on the list is Russia, with 300 Garfords and 180 Packards. Fifty KisselKars

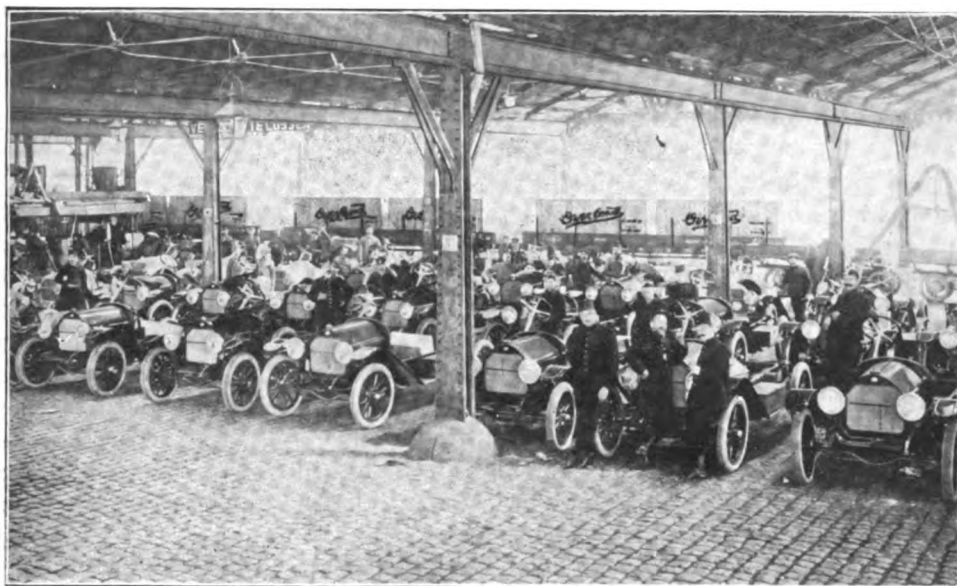
amounts through war sales: 1000 Autocars with a saving of \$150 each, total \$150,000; 750 Whites, \$112,500; 518 Packards, \$77,700; 340 Kellys, \$51,000; 300

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Fleet of 1½-Ton KisselKar Trucks Ready to Load for Export.

amounts through war sales: 1000 Autocars with a saving of \$150 each, total \$150,000; 750 Whites, \$112,500; 518 Packards, \$77,700; 340 Kellys, \$51,000; 300



A Section of the Battery of 300 Overlands Sold to Belgium Ready for Service on the Field.

Garfords, \$45,000; 300 Overlands, \$45,000; 200 Pierce-Arrows, \$30,000; 150 Jefferys, \$22,500; 150 Reos, \$22,500, and 50 KisselKars, \$7500. This gives the American manufacturers an extra saving of \$563,000 on one month's orders.

It must be kept in mind, however, that this is not ephemeral; the belligerent nations are still in the market for trucks, and will be as long as the war lasts. The average life of a truck abroad is placed at one week. Just how true this statement is cannot be ascertained at the present moment, but when it is realized that column after column of trucks are destroyed daily, the estimate can be appreciated. Likewise, keeping these facts in mind, it will be further understood that, at the termination of warfare, there will not be a sufficient number of trucks remaining to carry on the work of the peaceful countries. With the factories completely or partially destroyed, it is evident that the American manufacturer will be called upon to supply the whole world with trucks for some time to come.

The use of trucks from this country will undoubtedly prove a bigger advertising proposition than expected. In the first place there are more merchants, business men, financiers, etc., directly interested in this war than in any other in history. The truck is the big object of concern in every camp. This is well

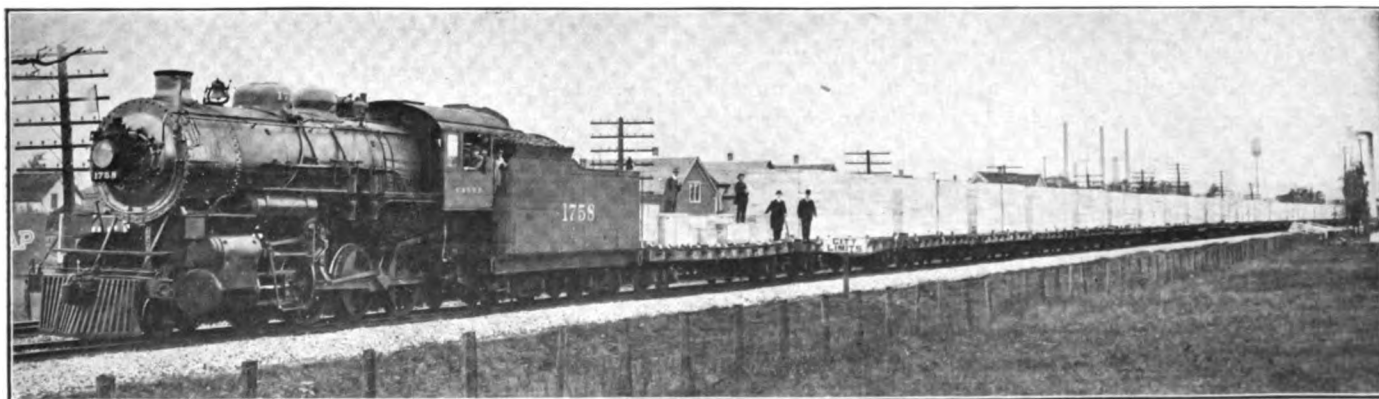
illustrated by the dispatches being received from the front. Consequently, the business man will have ample opportunity to see for himself the relative value of all the trucks represented.

From the reports received to date, it is obvious that the 2½ to three-ton truck is the most adaptable vehicle for active service. One of the chief faults found by the drivers is the insufficient clearance for war service in the field; the chains are frequently buried in the soft mud, and the rear axle covered. Interchangeable magnetos and carburetors are essential, as is proven

every day during the present conflict. Conditions demand standardization, and the American truck manufacturers are far in advance of their foreign competitors in this respect. Likewise, it can be safely stated that the American trucks have a greater road clearance than the English, French or German makes. This will be another factor tending to create a favorable impression for the American product.

The Thomas B. Jeffery Company, Kenosha, Wis., accomplished a noteworthy performance recently. After receiving an order on Thursday afternoon for 50 1½-ton motor trucks from a foreign government, the cars to fill this order were built, boxed and shipped on a freight train of 28 flat cars by 10 o'clock in the morning of the following Tuesday. This train, handled by four different railroad companies, went through from Kenosha, Wis., to Jersey City, N. J., in 50 hours and 50 minutes.

It is stated that the company's plants are working on three eight-hour shifts, Sundays, week days and holidays. In addition to the heavy war orders, the company's regular domestic and foreign trade in trucks has largely increased since the beginning of the European conflict. It is maintained by the Jeffery Company that only four or five truck makers in this country are obtaining these large foreign orders, for



A Train Load of 50 Jeffery 1½-Ton Motor Trucks Leaving Kenosha, Wis., En Route Abroad for Service in the European War.

invariably it is necessary to make shipment at a few days' notice. Only the very large plants are equipped to turn out 50 or 100 trucks in a week or 10 days, it is

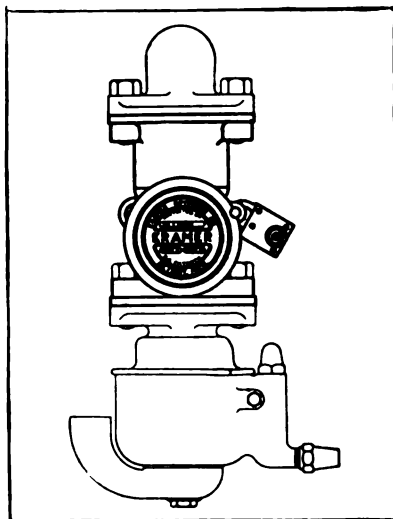


Fig. 1—Kramer Governor with Locking Device.

added. In most instances the conventional types of army bodies have been fitted to the trucks sent abroad. The White trucks had what is known as the Russian design. These cars are the regular two-ton model, the motor having a bore of $3\frac{3}{4}$ inches and a stroke of $5\frac{1}{4}$. The wheel-base is $145\frac{1}{2}$ inches and the tires are $3\frac{1}{2}$ -inch solids all

around, with duals in the rear. The load carrying platform measures nine feet six inches long and six feet wide.

The Overlands are in active service in the Belgian army, and it is claimed that it was through the work of this squad of 300 trucks that the successful withdrawal of the Belgian troops from beleaguered Antwerp was made possible. These cars were used continuously during the retreat from the city, making trip after trip, with loads of men, provisions and ammunition, between the city and the first line of the allied troops.

The continual rush of the campaign has left neither time nor provided facilities to care for maintenance. The cars have been forced to withstand terrible treatment, and the military authorities are absolutely ruthless in the use of the vehicles in their service.

KRAMER GOVERNOR.

Speed limitation of both internal combustion engines and commercial vehicles is an acknowledged necessity, and the practical device for controlling the motor must be constructed to meet the demands of this service, as well as being adjustable and tamper proof.

The Kramer Governor Company, 1843 Mount Elliott avenue, Detroit, Mich., is producing a new model of the Kramer governor, which is especially constructed for service with gasoline commercial vehicles, is adjustable and tamper proof.

It is a compact, self-contained unit, has no connections to any moving part of the motor, and has a minimum of moving parts. It is designed to control and maintain a constant speed, and the velocity of the incoming gases is utilized for operating the disc or control member, which floats in the path of the gases, as indicated at Fig. 2. This disc responds instantan-

ously to any variation of the velocity, and as the throttle is connected to this member, control of the fuel supply is automatically obtained.

One of the desirable qualities of the Kramer governor is that the throttle operates in harmony with the speed of the motor, and it is further claimed that it makes for a more homogeneous mixture at all speeds. Although the governor is set and tested for a maximum speed of about 1000 revolutions a minute, it can be adjusted as desired. Tampering is prevented by the use of a Yale lock, as shown at Fig. 1.

The workmanship and material utilized are of the best, imported ball bearings being employed on the shaft of the butterfly valve, and the throttle shaft is ground to close limits. Hardened steel bushings are used in the connecting links, and the construction throughout makes for durability and reliability. The company states that its product is standard equipment on a number of well known makes of commercial vehicles, and is adaptable to motor boats, tractors and stationary gas engines.

DIAMOND DETACHABLE CHAINS.

Diamond roller chains which have been made in the cotter pin type in some styles, are now furnished with this detachable feature in all sizes above $\frac{3}{4}$ -inch pitch. The increase in the facilities of the manufacturer, the Diamond Chain and Manufacturing Company, Indianapolis, Ind., which permits this extension of its line, has been made by reason of the demand for detachable chains for use under certain conditions where the riveted chain might not be applicable or convenient.

The engineering department of the company is at the service of every power user, and is ready to devote its expert and special knowledge to the solution of transmission problems. Diamond chains are accu-

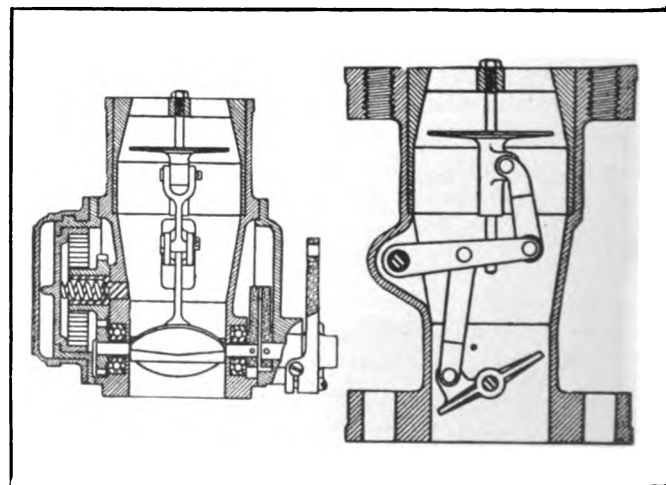


Fig. 2—Sectional Views of Kramer Governor, Showing Disc Operated by Gases and Connections to Throttle.

rately made of the best materials, carefully treated to best carry out the very trying service to which they are subjected.

PIERCE-ARROW INCREASES BUSINESS.

To say that the installation of a truck is a failure because it produces too much business, is indeed a unique way of expressing things. Such, however, is the idea given by J. P. Sullivan, president of the Sullivan Ice Company, Buffalo, N. Y., in speaking of a five-ton truck made by the Pierce-Arrow Motor Car Company, Buffalo, N. Y. In the early spring of last year the Sullivan Company ordered its first Pierce-Arrow truck, and it was figured that this vehicle would take the place of five of the company's teams. These teams were then employed in the wholesale trade for delivery to the retail departments of the business.

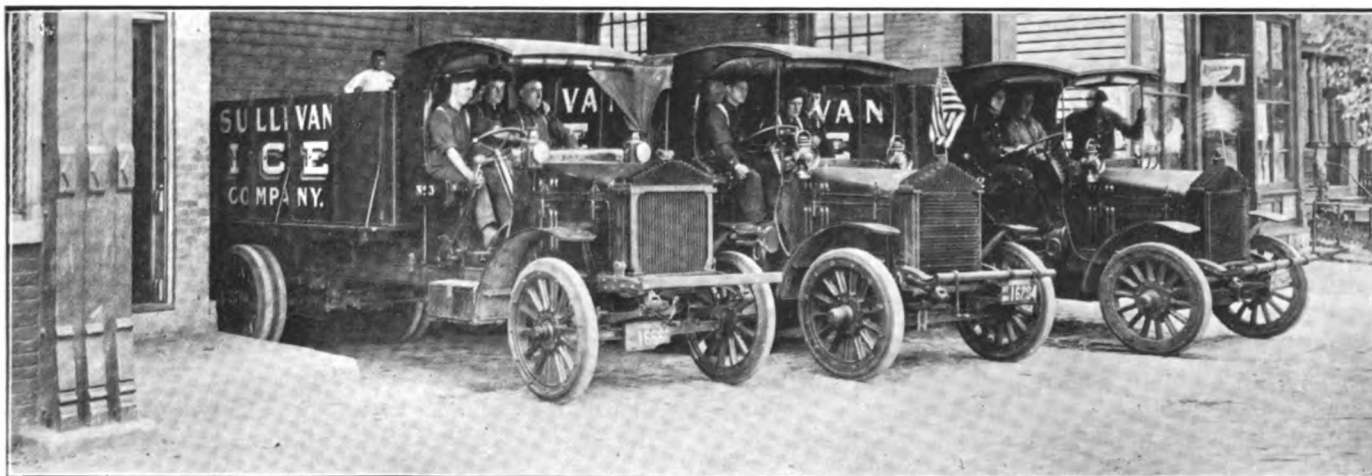
Mr. Sullivan points out that, as soon as the large wholesale fish houses, car refrigerating firms, etc., saw how quickly the Sullivan Company was supplying demands with its truck, the orders came so fast that the company was compelled to put all of the five teams back into commission until another truck could be

MOTOKART PLANT AT SCRANTON.

The MotoKart Company, Inc., New York City, after two months of negotiation with the Scranton board of trade, announces that an agreement has been made whereby a large plant will be erected in Scranton, Penn. The enterprise will be financed by the Scranton Industrial Development Company, and the Traders National bank of Scranton. The MotoKart Company makes a parcel car.

FOREIGN BUSINESS FOR BAKER ELECTRICS.

Announcement is made by the Baker Motor Vehicle Company, Cleveland, O., that negotiations have been closed by E. J. Bartlett, sales manager of the truck department, who has just returned from a three months' investigation of the field, for representation of the Baker Company in England by Wolseley Motors, Ltd., proprietors, Vickers, Ltd., London, England. The Wolseley Company, as is generally known



Pierce-Arrow Trucks in the Service of the Sullivan Ice Company, Which Have Proved to Be Invaluable to Buffalo Company.

purchased. This was a Pierce-Arrow five-ton truck also and, since that time, a Pierce-Arrow two-ton truck has been added to the fleet.

"Our trucks are on the go most of the 24 hours", says Mr. Sullivan. "In the morning at 5:30 they start out with full loads to the fish houses, after which they are kept busy with fruit cars, ice cream companies, freight and passenger steamers, besides the many special orders that are 'phoned in. The last thing at night the trucks bring in loads of natural ice from cars in the freight yards to our plant on Broadway. This is for our retail trade. In all, I should say that the trucks average from 50 to 75 miles a day, and work seven days a week.

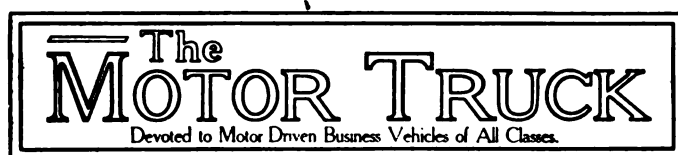
"We have had little or no trouble with the trucks and have only once been held up for a short time. That was when one of our trucks got mixed up with a street car. Upon telephoning the factory, an emergency wheel and mechanic arrived in a very few minutes and the truck was soon on its way, none the worse for the accident."

in the trade, is one of the most important English manufacturers of gasoline cars, its factory, in which are employed close to 5000 men, having an annual output of 3000 pleasure vehicles and 1000 trucks. Believing that conditions are favorable for the exploitation of the electric car, and having now in operation, as demonstrators, a number of Baker electrics, it will at once begin their sale through agents located in every English city of any importance, its activities being confined to the commercial line.

TRUCKS INCREASE IN MAINE.

There are now 634 trucks in Maine, compared with 366 last year. The total number of automobiles has increased from 10,351 in 1913 to 14,456 today.

With capital of \$200,000, the K. C. B. Company, Detroit, Mich., has been organized to manufacture carburetors for heavy fuel. J. H. Chambers, C. H. Bennett and A. A. Leslie are the incorporators.



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Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

INCREASES OF MOTOR TRUCK TAXES.

The disposition of legislators to compel the owners of motor trucks to pay large registration fees, because of the assumption that these machines cause more wear of the roads than other vehicles, is generally based on the helplessness or the indifference of the owners, or possibly, the assumption that they are sufficiently desirous of a specific party domination to contribute their assessments without material protest. The absence of organization is largely responsible for this condition. Motor truck owners are often too greatly engrossed in other matters to give the attention and support to the few who make remonstrance. State and community associations of transportation interests ought to be promoted because of the practical benefits that could be obtained. These ought to be advocated and supported by the manufacturers through their representatives, and by their own organizations. Unless there is systematic endeavor to prevent unreasonable taxation there is no doubt that truck taxes will be increased.

BUSINESS ECONOMY FROM TRUCKS.

The enormous saving possible through utilization of motor wagons and trucks is not realized because of the very general lack of knowledge of the cost of highway transportation. Practical economy is regarded as a necessary factor in business administration, yet comparatively few men engaged in commerce or in-

dustry avail themselves of opportunities that can afford extremely large returns. Commercial and industrial conditions impel economies, and there is no one department or division that can be so logically improved as that devoted to highway haulage. Not only are there large possibilities for saving, but the improvement of service can be made a very potent force for the development of patronage. The translation of equipment may appear to be questionable investment because of assumed sacrifice of property that is to some extent serviceable, but the continuance of its use means an extravagance that will be an increased burden and a decided handicap in competition with those who have improved their facilities.

FOREIGN BUYING OF MOTOR TRUCKS.

Several foreign governments now engaged in warfare have recently made contract with a number of American truck manufacturers for what will aggregate at least 2500 machines, and that figure will undoubtedly be exceeded. One will understand that these contracts mean profitable production and cash transactions, with no selling or maintenance or service expense. There is much more actual profit than would result from the same number of sales through ordinary channels, but such business will not create a constant demand abroad, nor will it promote the use of vehicles in America, so that it will only immediately benefit the manufacturers. Not only this, some of them will probably lessen their domestic activities during the periods their factories are building these orders, and there will be really less development endeavor than might obtain under other conditions. It is a distinctly opportune time for those not engaged with foreign contracts to exploit home markets.

THE TRUCK DRIVER PROBLEM.

Practically every truck manufacturer and nearly all employers complain of the great difficulty of securing drivers who are competent and who will work handling freight aside those who drive horses. They are agreed that the profit or loss from truck transportation is largely dependent upon the drivers, and yet a majority of truck owners will hire the men who will work cheapest, entrusting valuable property in their keeping, and permitting them to determine how much work they will do. The Motor Truck Club of America has undertaken to give some attention to operation of freight machines owned by its members, but the experiment has not been tried sufficiently to determine its efficiency. The manufacturers and their representatives can do a great deal by exercising supervision over vehicles they build and sell, by advising purchasers of machines of competent drivers, or by training men to qualify them for positions. The owners, on their part, must expect to pay for the services of men who are worthy and are willing to promote the interests of their employers.

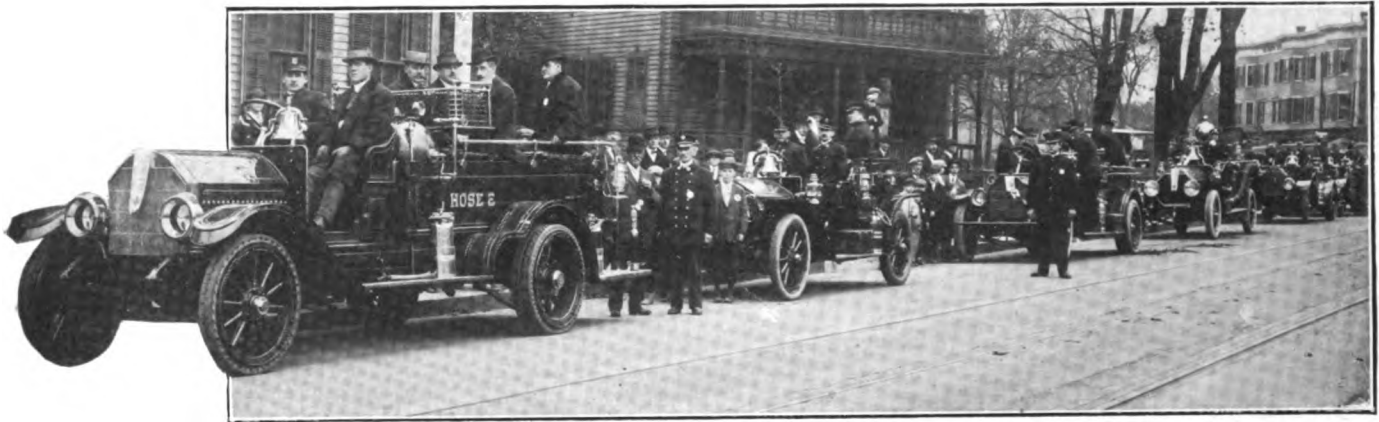
PAWTUCKET'S MOTORIZED FIRE APPARATUS.

Rhode Island City Has Model Department and Cost of Running Old Horse Drawn Service Was 18 Times Greater---Details of Equipment.

BY INSTALLING the first piece of motor fire apparatus in the State of Rhode Island, having practically a complete motorized equipment, an excep-

trast in the parade affording an effective object lesson.

Pawtucket has set an example for its sister cities in more ways than one on the question of up-to-date



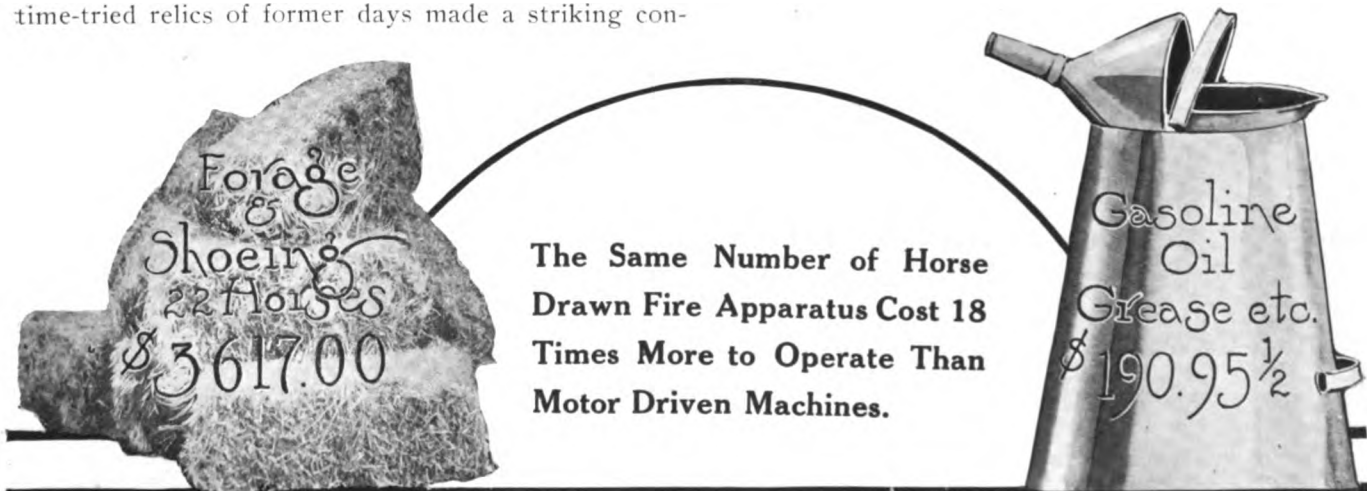
The Line-Up of Pawtucket's Motor Fire Apparatus Awaiting the Signal to Start on the City's First Fire Parade---In the Fore-ground Is Seen One of the Three New Boyd Combinations, Carrying the Fire Committee.

tionally low maintenance cost and a 100 per cent. efficient fire fighting force, the city of Pawtucket has a model fire department today, and one that compares favorably with any other in the United States. With six fire stations, each serving an area of approximately $1\frac{1}{2}$ miles, the Pawtucket department now has nine motor driven machines out of the 11 in use.

The motor equipment consists of one Webb triple combination pump; one Christie tractor attached to a Gleason & Bailey aerial truck; one National "40", used by the chief; three Garford and three Boyd combination hose and chemical machines. The absence of horses was strikingly shown at the first parade of the city's fire department on Oct. 24 last, when only four were to be seen in the line-up, representing the entire number in service. These drew two trucks, the last of the horse drawn vehicles. Tagging on behind the nine steel machines, painted a brilliant red, these time-tried relics of former days made a striking con-

apparatus. Unlike the majority of towns, this city has not bought its motor machines outright. In every instance the chassis was purchased and the body and equipment was built at home. By transferring the equipment from the discarded horse drawn wagons to the motorized vehicles, the department has been able to hold down the average cost of each motor driven machine to \$3200, exclusive of the pump and tractor. Considering that practically every other city in the country is paying from \$4000 to \$6000 for the same kind of apparatus, it is clearly seen that Pawtucket has been a leader in more ways than one in modernizing its fire department.

Credit for this work is due the joint standing committee on fire department of the Pawtucket city council. Previous to the installation of the first motor car, a National "40", this committee made a careful analysis of conditions, and after considerable investigation



four horses, required \$482 for forage and \$126 for shoeing, making a total of \$608. For the 12 months ending Sept. 30 last, the Garford "40" combination chemical and hose wagon, stationed at No. 1, consumed 105 gallons of gasoline, 5½ gallons of oil, 1½ gallons of alcohol and two pounds of grease. The total cost for this maintenance amounted to \$17.07½.

Station No. 2—Headquarters, with hose, truck, chief's and reserve machine. Eight horses required \$1164 for forage and \$152 for shoeing, making a total of \$1316. Comparing these figures with the year ending last September we find: Chief's car used 198 gallons of gasoline, 9½ gallons of oil, two gallons of alcohol, 10 pounds of grease and five dry cell batteries, making a total cost of \$33.67. The Webb triple combination wagon consumed 180 gallons of gasoline, 11 gallons of oil, two gallons of alcohol, five pounds of grease and four spark plugs, the total cost being \$30.45. In the same station the Christie front drive Gleason & Bailey aerial truck required 119 gallons of gasoline, 16 gallons of oil, four gallons of alcohol, two pounds of grease and three spark plugs, at a cost of \$25.76. In this station is also housed a Boyd combination chemical and hose wagon. This is one of the three Boyds now in service, which were only installed a little over a month ago. However, for the purpose of accurate comparison the consumption of gasoline, etc., for the first month in service will be used as a basis for estimating the full year's cost. On this basis the Boyd would have stood the department for the full year \$10.12½. This brings the total maintenance

expense for station No. 2 up to \$100.00½.

Station No. 3—Housing a hose and truck with four horses. Forage bill was \$532 and shoeing \$91, making a total of \$623. An estimate will have to suffice for the motorized apparatus in the station, as one of the new Boyd combination hose and chemicals is used. This would have cost \$19.05 for the full year, estimated on the basis of the first month's consumption.

Station No. 4—In 1910 a hose company with two horses. The forage bill was \$281 and shoeing \$56, a total of \$337. Estimating the Boyd combination hose and chemical expense again, it is seen that the cost would have been \$23.30.

Station No. 5—Hose company with two horses. Total cost was \$369, of which forage amounted to \$331 and shoeing \$38. For the year ending Sept. 30, 1914, the Garford combination hose and chemical consumed 70 gallons of gasoline, five gallons of oil, 1½ gallons of alcohol and two pounds of grease, at a total cost of \$12.17½.

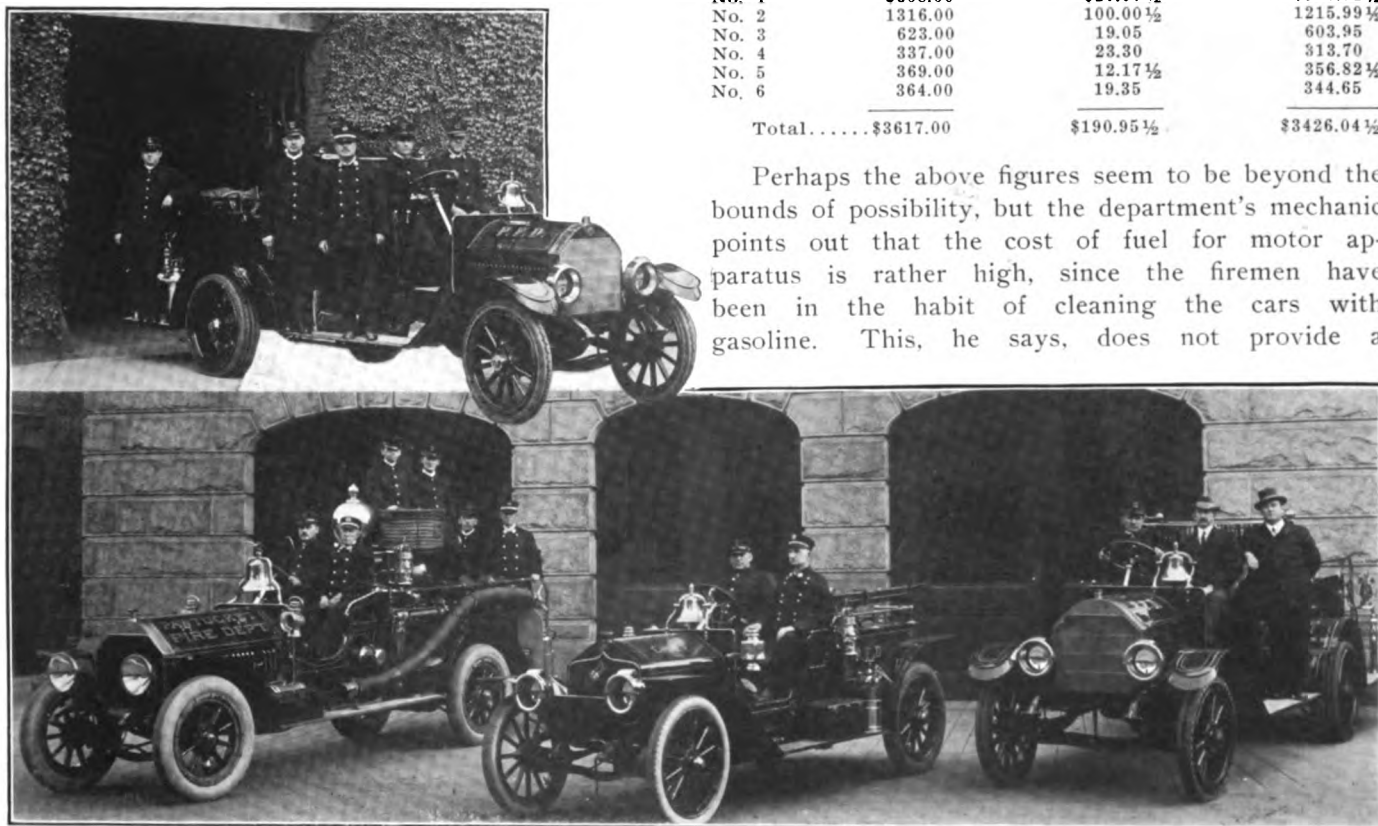
Station No. 6—Forage and shoeing cost \$364 in this station during 1910 for a two-horse hose wagon. Of this amount \$311 was for forage and \$53 for shoeing. The Garford combination hose and chemical for this period consumed \$19.25 for the following: Gasoline, 120 gallons; oil, 6½ gallons; alcohol, 1½ gallons, and grease, 2½ pounds.

Horse Cost 18 Times Greater.

For the sake of quicker comparison we will group and summarize the above items as follows:

Company	Horse Cost	Motor Cost	Motor Saving
No. 1	\$608.00	\$17.07½	\$590.92½
No. 2	1316.00	100.00½	1215.99½
No. 3	623.00	19.05	603.95
No. 4	337.00	23.30	313.70
No. 5	369.00	12.17½	356.82½
No. 6	364.00	19.35	344.65
Total.....	\$3617.00	\$190.95½	\$3426.04½

Perhaps the above figures seem to be beyond the bounds of possibility, but the department's mechanic points out that the cost of fuel for motor apparatus is rather high, since the firemen have been in the habit of cleaning the cars with gasoline. This, he says, does not provide a



Three of the Four Pieces of Motor Apparatus in Front of the Pawtucket Fire Headquarters, Showing the Webb Pump, National "40" and the Latest Boyd Combination Hose and Chemical. In the Upper Picture the New Boyd Combination at Station No. 4 is Seen.

fair comparison in regard to the motor car on consumption of fuel. However, ignoring this slight unfair condition, it will be seen that a modern, highly efficient motorized fire department is being maintained in Pawtucket for less than \$200 annually, whereas the obsolete fire horse required 18 times this amount.

On the question of wheels and tires, it will be found, of course, that the expense of the motor vehicle pneumatic or solid cushion tire is greater than the old time iron rimmed wheel. Tires in the Pawtucket department are replaced on the average of two shoes to each machine every two years.

High Maintenance Eliminates Depreciation.

The life of a motor driven fire machine is not known, as none of them has outlived its usefulness; thus, any statement on such a phase of the question would be a pure guess. However, it can be reasonably believed that the efficient maintenance and quick replacement of parts accorded the fire apparatus would eliminate depreciation.

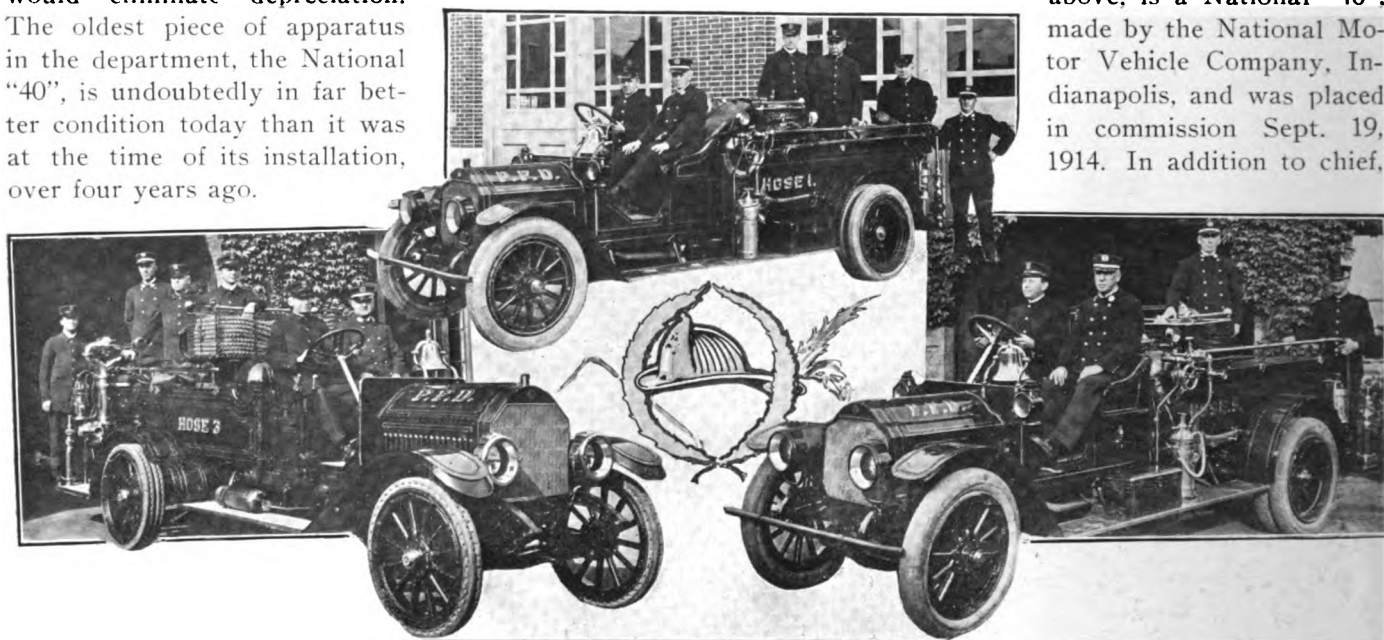
The oldest piece of apparatus in the department, the National "40", is undoubtedly in far better condition today than it was at the time of its installation, over four years ago.

full charge ever since. The men located in the various stations are not permitted to "tinker", the rule being that, in event of any trouble, the mechanic must be sent for immediately. The only latitude allowed the drivers of the different machines is the filling of the radiator, the gasoline tank and oil reservoir. All other work is handled by the mechanic.

Mr. Mack has a small repair shop in one of the old horse stalls and this is sufficient to handle all the necessary work for the nine machines. The shop is equipped with a bench, lathe capable of taking an 18-inch shaft, Bright drill, emery wheel, complete set of tools, etc. In case of an accident one of the city garages would be utilized, but during the four years, Mr. Mack says it has not been necessary to resort to that extreme.

Specifications of Apparatus.

Taking the various machines in the order of their purchase, the chief's car comes first. This, as stated above, is a National "40", made by the National Motor Vehicle Company, Indianapolis, and was placed in commission Sept. 19, 1914. In addition to chief,



Three of the Combination Hose and Chemical Machines in the Pawtucket Fire Department, the Garford, Boyd and Garford Being Shown at the Top, Left and Right Respectively.

The same condition does not apply to the horse drawn machines. There is a great difference in construction and instead of heat treated steel and iron, the old machines are made of wood. The two remaining horse drawn trucks in the Pawtucket department have seen so much service that it is not deemed advisable to fit them out with front drive tractors. The one exception to the above is the old horse drawn steam pump; its life of usefulness was almost endless. Taking it as a whole, the depreciation on the horse drawn wooden machine was far greater than it is on the steel motor apparatus.

Supervision of Motor Apparatus.

Pawtucket's motorized department is under the supervision of William G. Mack, mechanic, who has complete charge of the machines in the various stations. Mr. Mack joined the department at the time the first motor machine was purchased, and has had

this machine carries four men, and is equipped with extinguishers, axes, lanterns, small ladder and a smoke helmet. The latest official figures submitted on the cost of this machine are deceiving, but out of fairness to all concerned they will be given and explained.

For the three months and 12 days ending Oct. 12, the chief's National was driven 173 miles, consuming 80 gallons of gasoline, two gallons of oil and 10 pounds of grease, at a total cost of \$13.50. It is pointed out by the city clerk that for the same period the maintenance of a horse would have cost approximately \$56. But, as Mr. Mack explains, 10 gallons of the 80 charged up to the chief were destroyed by fire, and a great deal more was used at headquarters for the cleaning of this and the other three machines. "Taken as an average", says the department's mechanic, "the National will do six to eight miles a gallon, year in and year out". Obviously, the two miles a gallon

given it by the city officials is entirely unfair under the circumstances.

This machine responds to every alarm, and with its special equipment has extinguished many fires of a small nature. When this was Pawtucket's only motor fire fighting machine, it established a record for arriving at the scene of a fire and extinguishing the flames before the horse drawn vehicles were in sight. The National is a four-cylinder, with a water cooled motor, having a bore of five inches and a stroke of 5 11/16 inches, giving it a rating of 40 horsepower. Lubrication is by splash and pump, and the carburetor and magneto are a Schebler and Bosch respectively. Good-year non-skids are used on front and rear wheels.

Webb Pump a Triple Combination.

The Webb pump, made by the Webb Company, Allentown, Penn., was the second piece of motor fire apparatus purchased by Pawtucket, and was placed in service Aug. 21, 1911. When loaded to capacity this machine is capable of travelling a 10 per cent. grade at a rate of 35 miles an hour. The pump is guaranteed to deliver 750 gallons of water a minute through two 50-foot lengths of hose, or 600 gallons a minute

steel with 3/4-inch nickel steel truss rods.

Tread is standard, 56 inches, and wheelbase is 144 inches. Wheels are of the special artillery fire department type, 40 inches front and rear. Tires are Flsk pneumatic 40 by six, front and rear, of the quick demountable type.

The Webb has a guaranteed speed of 60 miles an hour and its gasoline capacity is 30 gallons. It is capable of carrying 1000 to 1500 feet of 2 1/2-inch hose.

Three Garford Combinations.

After the installation of the Webb pump over a year elapsed before any additional motor apparatus was installed by the department. The third piece was a Garford "40" combination hose and chemical, and since that time two more of these machines have been installed. The first Garford entered the Pawtucket service in October, 1912, and the following two in May and October, 1913. In May, 1913, a Christie front drive tractor was also added, as noted below.

The three Garfords, made by the Garford Company, Elyria, O., have four-cylinder motors, with a bore of 4 3/4 inches and a stroke of 5 1/2 inches. Lubrication is by splash, and cooling by water, circulated by pump. Bosch magnetos furnish the ignition, and the carburetors are Garford specials. Dayton airless tires

SPECIFICATIONS AND EQUIPMENT OF THE NINE PIECES OF FIRE APPARATUS USED BY THE FIRE DEPARTMENT OF THE CITY OF PAWTUCKET.

Car	Make	Cylinder	Bore	Stroke	H. P.	Lubrication	Cooling	Carburetor	Ignition	Speeds	Wheel-base	Tires
Chief's	National	4	5	5 11/16	40	Splash and Pump	Pump	Schebler	Bosch Magneto	3	124	Goodyear
Pump	Webb	6	5 3/4	6	90	Mechanical Oil	Pump	Mayer	Bosch Magneto	4	144	Flsk
Tractor	Christie	4	5 1/2	7	90	Splash	Pump	Stromberg	Bosch Magneto	2	..	Swinehart
Com. H. & C.	Garford	4	4 3/4	5 1/2	40	Splash	Pump	Garford Spec.	Bosch Magneto	3	144	Dayton
Com. H. & C.	Garford	4	4 3/4	5 1/2	40	Splash	Pump	Garford Spec.	Bosch Magneto	3	144	Firestone
Com. H. & C.	Garford	4	4 3/4	5 1/2	40	Splash	Pump	Garford Spec.	Bosch Magneto	3	144	Goodyear
Com. H. & C.	Boyd	4	5 1/2	6	48	Pump	Pump	Rayfield	Bosch Magneto	3	144 1/2	Goodyear
Com. H. & C.	Boyd	4	5 1/2	6	48	Pump	Pump	Rayfield	Bosch Magneto	3	144 1/2	Goodyear
Com. H. & C.	Boyd	4	5 1/2	6	48	Pump	Pump	Rayfield	Bosch Magneto	3	144 1/2	Goodyear

*Also Atwater Kent battery.

through two 50-foot lengths of hose siamesed into one line, with a one to two-inch tip.

The water pressure in Pawtucket is sufficient to eliminate the use of a pump were it not for the demands of the fire underwriters. However, this is held in reserve in case anything should happen to the pressure, and in order that there will be no loss, the department has converted it into a fully equipped chemical and hose, making a triple combination. This machine has a 90-horsepower, six-cylinder, T head motor, having a bore of 5 3/4 inches and a stroke of six inches. Lubrication is by a sight feed mechanical 10-point oiler and splash system, and cooling is by water, circulated by a gear pump.

Ignition is by two separate and distinct systems, a Bosch high-tension magneto, and an Atwater Kent battery. The carburetor on the Webb is a Mayer. The transmission is of the selective sliding gear type, with direct drive on high, having four speeds forward and reverse. Other detailed specifications of the Webb motor rotary pump are:

Brakes are interchangeable expanding on rear wheels. Two external contracting brakes on jack shaft near sprockets. Total braking surface 400 square inches.

Clutch is three-disc type with cork inserts, and bearings are ball and roller throughout.

Springs are semi-elliptic front and rear, clipped for rebound. Axles are three-inch, extra heavy I beam shape, made of chrome nickel steel. Front axle clearance is 12 inches and rear 16 inches. The frame is extra heavy, heat treated, pressed

are on the rear dual wheels of one of the machines and Firestones on front; Firestone pneumatics are used on the front and dual rear wheels of the second, and the third Garford is equipped with Goodyear pneumatics on the front and dual rear wheels.

Christie Tractor for Truck.

A Christie tractor, made by the Front Drive Motor Company, Hoboken, N. J., is attached to the old horse drawn Gleason & Bailey aerial truck. This tractor has a 90-horsepower, four-cylinder motor, with a bore of 5 1/2 inches and a stroke of seven inches. Lubrication is by splash, and the water for cooling is circulated by a pump. A Stromberg carburetor is employed, and ignition is by a Bosch magneto.

In order to assure greater protection, Mr. Mack has placed an extra brake on the Christie. This extends to the rear wheels, a distance of 25 feet, and applies on brake drums, constructed in the conventional manner. While the ordinary emergency brake would doubtless serve its purpose at all times, yet the department's mechanic felt that in descending some of Pawtucket's hills it would be dangerous in event the regular brake failed to work. Swinehart solid tires are used on the Christie tractor.

Boyd's the Latest Equipment.

Much interest is naturally being displayed in the three new Boyd combination hose and chemical ma-

chines. These are the product of James Boyd & Brother, Inc., Philadelphia, Penn., and have been in service for a little over a month. As in the case of the other equipment, the chassis were purchased from the company, and the bodies were built by the F. N. Blake Company, Pawtucket, R. I., the first Garford body also being made by the same concern. The other Garford bodies were constructed by Perry Brothers of the same city.

The new Boyd machines have four-cylinder motors, cast in pairs, with valve chambers, water jackets and cylinder heads integral; bore is $5\frac{1}{2}$ inches and stroke six inches, giving it a 48.4 S. A. E. horsepower rating. However, on brake test the engine develops 86 horsepower. The intake and exhaust valves operate mechanically on opposite sides of the motor and are interchangeable. The pistons are fitted with four compression rings and one oil ring, making five in all.

Other details of the Boyd specifications follow:

Crank case is cast in halves and made of aluminum alloy. The upper half supports all the crank bearings, and the lower

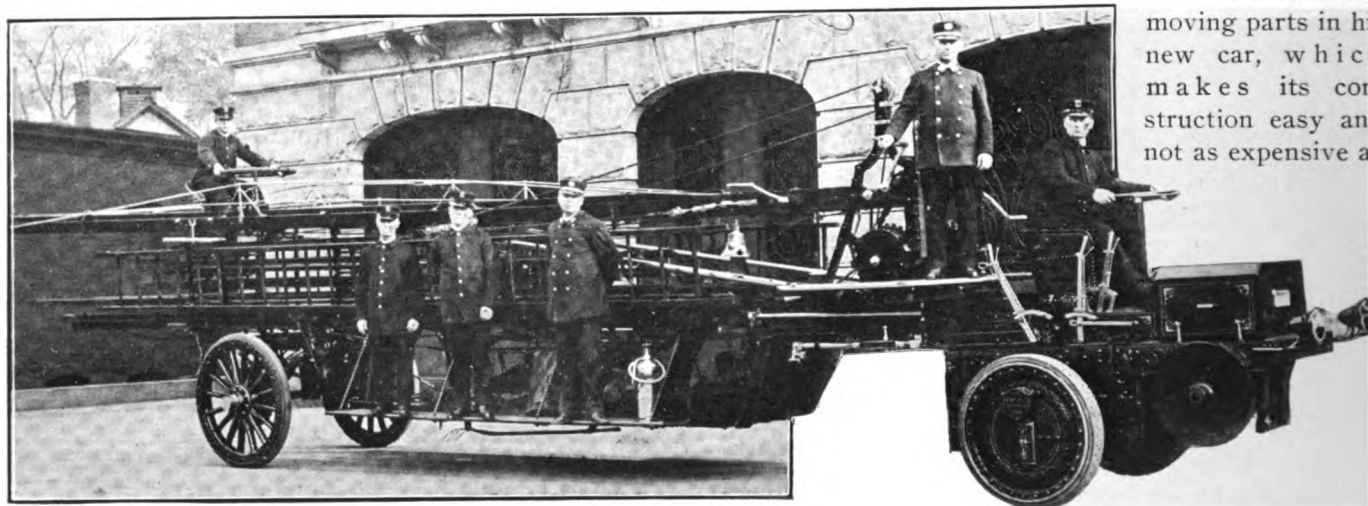
cushion solid tires, and Mechanician Mack states that these have given satisfaction.

From the foregoing it will be seen that Pawtucket has a model motorized fire department in every respect. The work of the nine machines in service has convinced the committee and citizens that the entire department should be completely motorized, and the commission states that by June, 1915, the horse will be nothing but a memory in the fire department service.

TO BUILD NEW MOTOR CAR.

Abner Doble, inventor and designer of the Doble steam motor car, has interested Wilmington, Del., capital in his invention and a company will be formed there to build a plant to manufacture the car, a site having already been chosen. Mr. Doble will be president of the company, Col. G. B. Postles, vice president, and R. R. Wittingham, secretary and treasurer. The company will specialize in trucks. Mr. Doble says

there are but 24 moving parts in his new car, which makes its construction easy and not as expensive as



The Christie Front Drive Tractor, Attached to the Old Horse Drawn Gleason & Bailey Truck—Note the Second Emergency Brake Running Back to the Rear Wheels: This Was Constructed by the Department's Mechanic.

acts as the oil receptacle in the conventional manner.

Crankshaft is of nickel steel, solid forged, and the shaft runs on three bearings. The connecting rods are bushed on the crankshaft end with Parson's white brass, and the wrist pin end has a hardened steel bushing. A flange on the flywheel end is forged integral with the shaft and the flywheel is bolted to this flange.

Camshafts, located on opposite sides of motor, are lubricated from the splash in the crankshaft.

Clutch is a leather faced cone type, of large dimensions. Lubrication is by pump, the oil supply being carried underneath the pan of the motor and pumped by means of a small rotary geared pump. This pump also supplies the connecting rod bearings and wristpin in bearings with oil under pressure. The oiler is also provided with an overflow, which sprays oil on the time gears, fan gears and magneto gears.

Cooling is by water, a gear driven centrifugal pump being driven from the camshaft.

Transmission is of the selective type, with three speeds forward and reverse.

Drive is by double side chains from both ends of the jackshaft to sprockets on the rear wheels. Forward sprockets are made large to reduce the wear on the driving chains. The radius rods, forward ends of the rear springs and jackshafts are all contained in one large steel casting.

Brakes are of the double internal expanding type. The emergency and service brakes, operating on separate steel drums, are fastened to the hubs of the rear wheels. The emergency brake is $12\frac{1}{2}$ inches in diameter, with brake shoes $2\frac{1}{4}$ inches wide, fitted with Autobestine brake lining.

All of the Boyd combination chemicals in the Pawtucket department are equipped with Goodyear

other cars. The engine will burn anything from crude oil to gasoline. The boiler and condensing appliance are so perfected that the inventor claims the car will run 1000 miles without stopping to take water. The scheme of lubrication is such that no oil cups are necessary.

MOTOR 'BUSES FOR MANCHURIA.

Japanese residents in Manchuria are reported to be organizing a company with the object of establishing a public motor car service between Pulantien and Pitsuwo.

FINNISH TARIFF ON MOTOR PLOUGHS.

The customs authorities of Finland have announced that the duty on motor ploughs will be 10.6 marks a 100 kilograms, about \$2.10 for 220 pounds.

SCIENTIFIC HIGHWAY BUILDING.

The nation, the states and the municipalities have been awakened to the need of improved highways. Large sums of money have been appropriated for construction, but a large part of these appropriations have been or are being wasted because no standard of construction or maintenance has been established. The highways of France, regarded as the finest in the world, have been built by trained engineers to specifications that have been developed during nearly 150 years' experience, and are inspected and maintained with extreme care.

The United States has a bureau that has been created to afford scientific advice to all who desire it. The resources of this office are available to all. The nation, however, has not yet undertaken road building, aside from work performed under the direction of the commissions that govern the districts and reservations. The states, counties, cities and towns have highway departments. With practically no exception road construction is determined by political expediency, often for the benefit of the individual or the few, and generally to meet the requirements of the official of jurisdiction, who may have or not have practical knowledge, but may be depended upon to have work done where it will produce the votes.

Theoretically, state highways are well built, and assumedly to a standard in the state, but state work is usually more expensive than private construction, and even were the roads uniformly constructed they must be regarded as varying with similar work in every county, city or town. The maintenance is frequently almost a joke, for with rare exception work is deferred until costly reconstruction is necessary, and the public is more or less incensed because of the apparently rapid deterioration of the ways.

What is needed is a national highway construction standard, such as could be applied in any state or county or town, with such option as might be necessary to utilize locally available materials, and a systematic method of maintenance. The system should be developed with a view of promoting highway traffic between commercial centres and between states. The municipalities and the states should unite in activities and co-operate in real business promotion. If the states can unite on anything it ought to be road making, and until they do unite the roads built will be far from satisfactory and extremely costly.

The White Company, Cleveland, O., has opened a factory branch in Seattle, Wash., to supply the trade of Washington and Idaho. The new branch will be in charge of E. W. Hill, who represents the White interests in the Pacific northwest.

The Studebaker Corporation, Detroit, Mich., has appointed R. G. Larimer eastern district manager of the truck department.

VAN DERVOORT FOR PRESIDENCY.

W. H. Van Dervoort, president of the Moline Automobile Company, East Moline, Ill., has been nominated for the presidency of the Society of Automobile Engineers for next year, to succeed Henry L. Leland. Other officers nominated were: Frederick R. Hut-ton for first vice president; Joseph A. Anglada for second vice president, and A. B. Cumner for treasurer. The following have been nominated for councillors: C. B. Rose, John Wilkinson, W. P. Kennedy and Frank M. Germane, all for 1915-16, with the exception of Mr. Germane, who is nominated for 1915 only.

Mr. Van Dervoort has had a wide experience in the automobile industry, and prior to entering that field was a professor in the University of Illinois.

BRITISH EXPORTS SHOW LITTLE CHANGE.

For the eight months ended Aug. 31, the British automobiles, chassis and parts, motorcycles and parts, etc., exported to foreign countries, totalled \$17,204,475, compared with \$17,323,195 for the corresponding period of the previous year. Imports for these periods were \$27,474,700 and \$26,498,480 respectively.

For the month of August, 1914, exports of these articles amounted to \$1,510,685, as compared with \$1,955,495 for August, 1913. Imports show a decrease from \$3,134,235 for August, 1913, to \$555,335 for August, 1914.

ABANDON OLYMPIA SHOW PLANS.

The annual Olympia show, scheduled for November in London, England, has been abandoned. This, of course, is due to the war. The Institution of Automobile Engineers will hold its regular programme of sessions, but all papers will deal with the position of the industry in regard to the present war situation.

COMMER CARS FOR BRITISH WAR OFFICE.

Commercial Cars, Ltd., Luton, England, is delivering motor lorries to the British war office at the rate of 14 a week. The commandeering of Commer cars throughout England has led to the placing of hundreds of orders for new vehicles.

The American Locomotive Company, formerly manufacturer of the Alco car and trucks, has discontinued its Long Island City service station. New York owners of Alco machines can obtain parts of the International Motor Company, at West End avenue and 64th street, in that city.

The Wilson Tire & Rubber Company, Springfield, Ill., is rushing the construction of its new plant. The company expects that the entire plant will be under cover by Sept. 15.

TRUCK POWER OPERATES WATER MAIN GATES.

LARGE municipalities owning their own water systems necessarily maintain repair and maintenance departments, with men and equipment to meet any probable requirement. The tools are generally such as are standards for work of this character, with such special apparatus as may have been built to meet unusual conditions. Some apparatuses have great value and are economical to a surprising degree, although economy is not often regarded in an emergency.

Such an equipment is a White truck used by the water service division of the public works department of Boston for an emergency wagon. This machine has been in use for a considerable length of time, but not until recently was it equipped with the special gearing

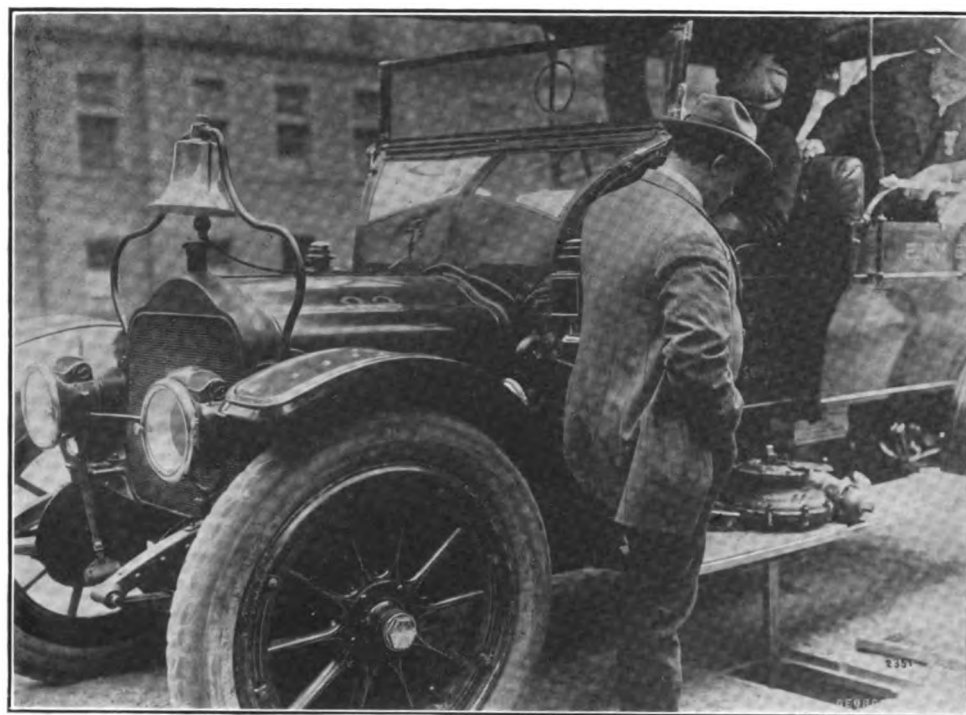
without the equipment approximately 45 minutes time for four men.

The emergency wagon was found a great saving of time in travel and handling tools and supplies, but with calls frequently overlapping and considerable distances apart, the only solution was either another vehicle or additional apparatus. George H. Finneran, superintendent of the water distribution department, devised the apparatus, which not only greatly economizes the time of the machine, but has minimized the labor and very much increased the service.

This equipment consists of a universal wrench socket with a worm gear enclosed in an aluminum housing and so installed on the running board of the

machine that the gear may be located directly over the water gate when the truck is driven to it. The gear is driven off the power transmission gear-set and is operated by a lever on the side of the truck convenient to the driver. For closing the water main gates the forward speed ratios of the gearset are used, and the reverse ratio for opening the gates.

The gate opening gear is built with gears of chrome nickel or nickel steel, and the shafts are mounted in ball bearings. The aluminum housing is rigidly bolted to the chassis frame and braced to resist torque stresses. As may be noted from the accompanying illustration the gearing is carried on the right running board almost beneath the eyes of the driver. The



Power Main Gate Valve Wrench Installed on the Running Board of the White Emergency Wagon Operated by the Water Service Division of the Boston Department of Public Works.

to operate the gate valves of the water mains. The gates of these supply mains are reached from small openings in the street surfacing that are covered by iron plates.

Because of the pressure maintained a flow of 50,000 gallons a minute might result from a burst in the largest main. The emergency wagon and a crew of men is constantly on duty. The city is 15 miles long and nine miles wide, and the calls may require runs for a single block or to the end of a water supply in one of the suburbs.

The water main gates are raised and lowered by special gearing because of the great pressure and the absence of lubricant. The gate gearing is operated by turning a wrench fitted on to a squared end or nut. With the 36-inch main gates 307 turns of the wrench are necessary to open or close them, and working

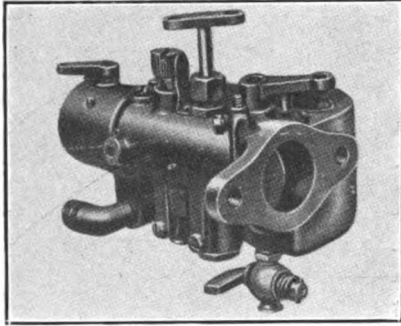
wrench is a hollow square steel tube fitted with a universal joint and a special hardened steel socket. The upper end of the tube fits a socket in the gear case on the running board and the lower end socket fits a nut on the gate gear. The universal joint compensates for any variance of the chassis from a position directly above the nut of the gate gear.

Indicators generally show the position of the gate valve, but where such equipment is lacking a counter placed on the end of the wrench indicates the number of revolutions of the gear. As a further safeguard a pin of known strength is placed in the universal joint of the wrench, which will shear when the gate is seated so that the gate and the wrench will not be damaged by continued operation of the motor gearing. One man can operate the largest gate, either opening or closing it, in 10 minutes.

NEW COMMERCIAL CAR ACCESSORIES.

MARVEL CARBURETOR.

The Marvel Carburetor Company, Flint, Mich., whose product is utilized on several well known motor vehicles, is



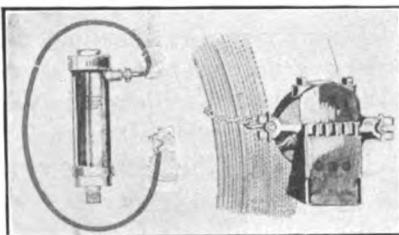
marketing a carburetor especially constructed for the model T Ford motor. The Marvel is very compact, and one of its qualities is that it can be installed without any alterations. The pipe for utilizing the heat of the exhaust can also be employed.

A feature of the Marvel is the simplicity of its construction and the provision made for controlling the supply of air. The air adjustment is conveniently located on the top of the carburetor, and the usual valve for shutting off the air supply when starting is incorporated. This is operated by a rod extending to the front of the radiator. The fuel needle valve is so arranged that the Ford dash control rod is utilized. As previously stated, the Marvel may be installed without any changes. Economy of fuel, flexibility and ease of starting are features of the construction emphasized. The carburetor is known as the model N and operates on the same principle as the well known model E.

HANDY POWER PUMP.

The National Motor Supply Company, Cleveland, O., has brought out a small production of its well known National telescope pump for small cars, such as the Ford, Metz, etc. It is also adaptable to cyclecars. The National is constructed similar to the internal combustion engine, having a cylinder of gray iron and a piston. The last named member is turned from a solid steel bar. The National pump is constructed with the same high-grade material and workmanship for which the products of this concern are noted, and will inflate a Ford tire to 60 pounds in two minutes. A pressure of 150 pounds is obtainable if desired. The pump screws into the spark plug opening in the cylinder, has 10 feet of extra heavy, fabric covered hose, with dial pressure gauge in line if desired.

The company is also marketing the G-Wiz steam vulcanizer, a small edition of the Wizard, and intended for tires and tubes $3\frac{1}{2}$ inches and smaller. The water utilized is enclosed in a metal body and the supply does not require replenishing. The heat is automatically controlled, and the vulcanizer can be successfully employed by the most inex-



perienced. Complete instructions and supplies accompany each outfit, which weighs but two pounds. The G-Wiz vulcanizer is inexpensive.

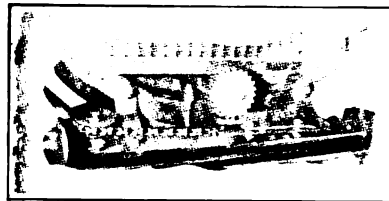
MURPHY MOTOR STARTER.

One of the features claimed for the Murphy mechanical starter, made by the Murphy Starter Company, Ida Grove, Ia., is that it is applicable to and practical with any type of motor vehicle. That shown in the accompanying illustration is the Ford.

The starter is of the sliding gear construction. A pinion, fitted to a short shaft and having an engaging clutch at its inner end, takes the place of the usual hand crank. This pinion is actuated by a gear or rack, which moves freely.

A single movement of a pedal engages the clutch with the motor and, by pulling a hand lever conveniently located to the driver, the crankshaft of the engine is rotated rapidly by the gear actuating the pinion, as considerable leverage is obtained by the construction.

One of the starter's qualities noted by the maker is that it can be installed without removing the radiator from the

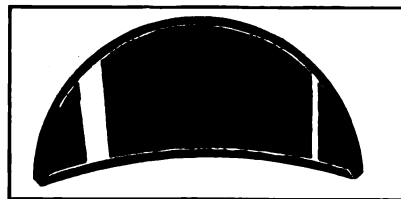


car. No changes, machining, etc., are necessary. Provision is made for preventing any injury to the mechanism in the event of a back fire of the motor, and it is stated that it requires but little effort to spin the crankshaft.

THE AMERICAN DIMMER.

The American Mantel Company, 910-936 Central avenue, Hamilton, O., is marketing a headlight dimmer for motor vehicles. As may be noted by the accompanying illustration, it is constructed to be inserted in the lamp in front of the source of light, and its function is to eliminate the upward or glaring rays.

The maker states that it conforms to all ordinances pertaining to the use of



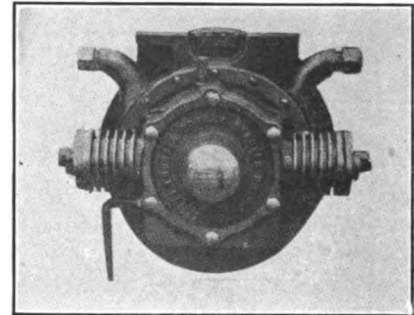
headlights, and that it does not impair the efficiency of the lamps. It is made in sizes from $6\frac{1}{2}$ to 11 inches and comes in black and aluminum finishes, or in bronze. It is moderately priced.

COLLAPSIBLE BUCKET.

The B. F. Goodrich Company, Akron, O., is marketing a collapsible water bucket, a practical water container, one that can be folded into a small space and stored easily on the car. It is made of water proof material and is fitted with a nozzle and shield, the latter being made of rubberized fabric. The construction enables easy replenishment of the supply in the radiator and without spilling.

THURBER ROTARY STARTER.

The Northern Engineering Works, Detroit, Mich., is manufacturing the Thurber rotary starter, which is adapt-



able to any motor vehicle, and it operates on the compressed air principle. Mounted at the front of the chassis is the combined rotary engine and air pump, a unit construction, and the starter proper obtains its energy with a small amount of air by means of reduction gearing.

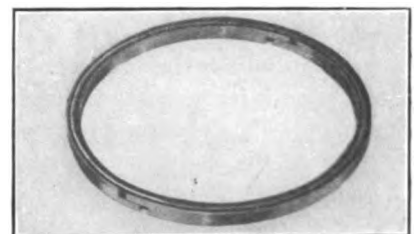
The starting device operates on the well known rotary principle, and is actuated by placing the foot on the starter button mounted on the footboard of the car. This allows air from a tank to flow to the rotary construction, which includes an automatic clutch, which comes into operation when energy is applied to the engine shaft. Upon the motor starting all parts of the starter become inactive, with the exception of a central shaft, which is mounted on ball bearings.

The supply of air in the tank is maintained by a pump and a dash gauge indicates the amount on hand. The pump is controlled by a pedal and the supply is renewed as required. Provision is made for utilizing the air for inflating tires, and the maker states that the Thurber double-acting valve absolutely prevents loss of air.

The Thurber rotary starter is applicable to all types of gasoline motors, and the company produces equipment to meet all requirements. Complete details and prices will be forwarded upon request.

MCCADDEN PISTON RING.

A new type of piston ring, held to be leakless by the maker, the McCadden Machine Works, St. Cloud, Minn., is the McCadden. It consists of two concentric rings, one within the other, and the lap joint of the outer is spaced diametrically opposite the joint in the inner and is held in position by a dowel pin. It is claimed that it is impossible for this pin to work loose or into a position that would cause it to score the walls of the cylinder, as it is not drilled through from either ring. The lap joint is milled to exactly one-half the ring width, and the inner ring is exactly the same width as the outer ring. As its joint is diametrically opposite that of the other ring, it is held to be leak proof. The McCadden is made in various sizes.



NEW TYPE OF BRITISH ARMORED TRUCK.

EVERY foreign dispatch tells of additional feats accomplished by the motor vehicle in the European war. Obviously, horse drawn vehicles have become obsolete in warfare and the automobile has proven itself invaluable in transporting men, just as the motor truck has in the carrying of supplies and equipment.

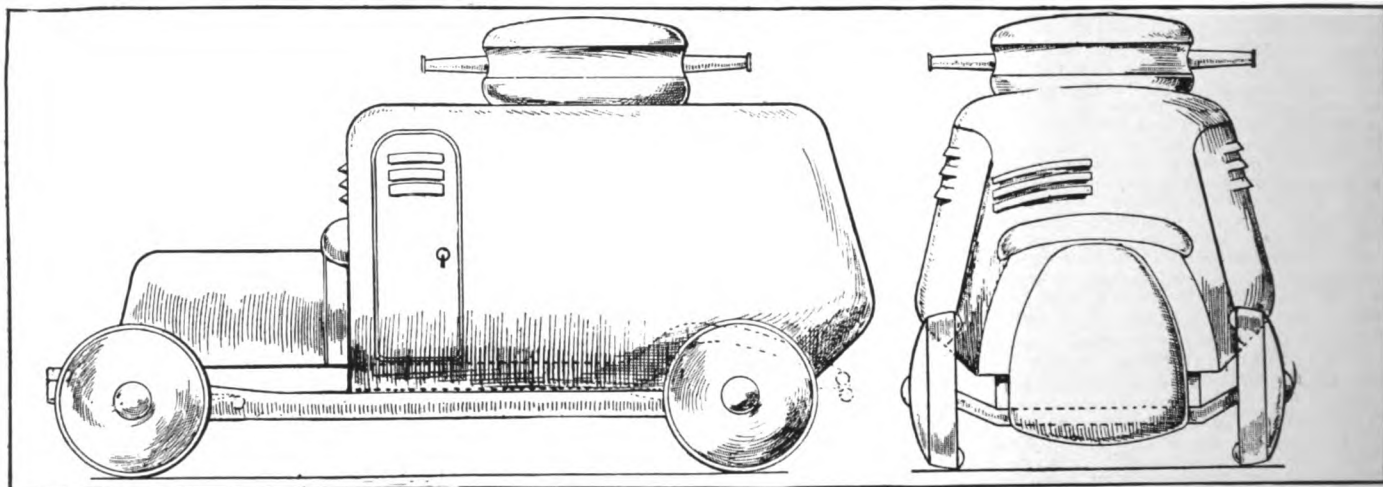
The early days of the war showed conclusively, however, that ways and means would have to be devised for the protection of the motor vehicles in use. At the beginning of the war various makeshifts were tested to safeguard motor cars, but it was soon found that the success of the armored car depended entirely upon its completeness. In a recent issue of *Motor Traction*, an English magazine, John Armstrong states that he is now at liberty to furnish the details of a special new gun car of British origin. This new armored machine possesses the following points:

An armor-plated upper and under structure, so as

sents exactly the shape of the sides. Another feature of interest, which, however, may not be more than hinted at, is that upon the armor plate is laid a special composition for a certain purpose".

At either side is a louvered door, which, in addition to being arched and rounded lengthwise, possesses strong hinges, and lies flush with the side of the body when closed. What may be termed the dashboard, continues the writer, is rounded, has special louvers for the driver's observation, and is carried upwards to the slightly arched roof. On the roof is mounted a cupola or turret having a pair of quick firing guns, as shown, a characteristic not dissimilar to the bow and stern chaser system aboard a ship of war.

The armor plate bonnet is arched at its front and lengthwise; it is without any opening, and its forepart extends down below the front axle as a protective shield therefor. Behind the bonnet and against the dashboard is the radiator, the nature of which is not



Side and End Elevation Views of the Proposed Armored Motor Vehicle Designed for Use in the British Army—Practically Every Part of the Vehicle Is Protected.

practically to be invulnerable everywhere.

The exterior configuration of such armor plate must afford the maximum facility for receiving glancing blows from the projectiles fired at it.

To ensure high speed with the minimum amount of vibration, the tires must be pneumatic, but both they and the wheels must be armored adequately.

The engine and all its adjuncts must possess efficacious protection.

The accompanying illustrations show the above ideas carried out. The machine's outline has a length between wheel centres of some 15 feet, with five feet 10 inch width of track. The superstructure is formed of steel angle framing, covered with sheet steel. Its shape, upon which the inventor places the highest importance and faith, may be described, says *Motor Traction*, as "well rounded all over. That is to say, the sides of the body, which reach down to and over the lower edge of the chassis, are of the same bellied contour as the back. The outline of the stern repre-

less than advantageous. It constitutes the first example of an armored cooler. The vertical tubes terminate in tank and header as usual, but the whole is surrounded from top to bottom with armor plate. At the upper extremity there is a cupola like cover, slightly larger than the outer sides of the cooler, through which space the air is drawn in and downwardly, being forced out beneath the car through fan ventilation, ensured by surrounding the vaned flywheel of the engine with an air tight casing jointed to that of the radiator.

The springs, which are of the flat, semi-elliptic underslung sort, are furnished upon the outside with arc shaped and domed shields. Below the chassis there extends from front to rear axles a semi-torpedo shaped shield, further protected by lateral semi-circular valances, one of which is of extra defensive strength forward, where it completely covers the steering gear rods.

Quite one of the most practical points in this strik-

ing engine of war is that both the wheels and tires are armored. They are constructed as steel discs having solid rubber band tires, yet they are of the pneumatic order, and devised in an extremely ingenious manner at that. In this regard the aim of the inventor was to evolve a pneumatic tire that should actually be indestructible by punctures derived from road surface or fire arms.

This is its nature: the wheel proper (rotating on the end of the hollow driving axle as usual) is a flat steel disc embodying a deep circumferential groove wherein is inserted an air tube covered with a particularly strong but flexible fabric. On the outer side of the wheel is a second steel disc, but of slightly larger diameter, of concave formation, and the periphery of which has a solid rubber tread. Thus it will be understood that the pneumatic air tube is sandwiched between the inner flat disc and its outer armored fellow. At its nave this second disc rides upon a readily removable coned piece fixed on the axle end. The result is that the oscillation, imparted to the wheel by irregularities of the surface over which the vehicle is travelling, causes the second disc to move laterally, so that its tread describes a small arc. In this way not only is a true armored pneumatic tire achieved, but also a real puncture proof tire at one and the same time. It is accomplished by the combination of the air tube holding the pair of wheel discs apart pneumatically; and compression of the tube, when the wheel strikes an obstacle in its path, is in a vertical line below at the point of contact, while at the opposite extremity, expansion occurs in a horizontal direction; or, in other words, the action of the ordinary pneumatic tire is reversed.

Touching the internal mechanism, here we are given further proof of a keen foresight of the purpose intended, rarely to be met with in conventional engineering circles. The engine, having four vertical cylinders, is of 60-80 horsepower. There is a leather faced cone clutch transmitting the drive through a four-speed gate controlled gear box, and a single-jointed, enclosed propeller shaft to a bevel geared live axle. A pair of expanding brakes is enclosed within a drum on the inner hub of each road wheel, and there is also a mechanical (i. e., a spring and trigger) sprag. A number of component parts are in duplicate. For instance, as to the lubrication system: there is a pair of mechanically driven oil pumps, one of which is a standby, capable of being brought into use by the motion of a small hand lever. Precisely the same ingenious principle has been originated for the maintenance of the water circulating system, in spite of the fact that, normally, the engine cylinders are cooled by thermal action. There are two carburetors, one of which is a standby. Again, there is a pair of high-tension magnetos driven by one shaft. One is ready instantly to take up work in case its fellow fails.

The motor is started up electrically, the vehicle is lighted by electricity, there is a powerful searchlight, as well as night signalling apparatus of a special kind.

Moreover, there is an engine starting handle, not, however, in front where it might easily be damaged, but at the back of the dashboard.

The object of these, and like, precautions is to ward off internal troubles to the utmost extent. Once the occupants of the car have ensconced themselves within their travelling castle of steel it is intended that the vehicle shall not fail for lack of locomotive energy. The driver need never alight to start his engine or to attend to tire troubles, since even the collapse of an air tube will not prevent his "carrying on".

MOTOR CAR INDUSTRY IN AUSTRALIA.

A separate record of industrial motor vehicles registered in New South Wales has been kept this year for the first time. The figures show that the number of these vehicles increased from 411 at the beginning of the year to 518 on June 30 last. Considering the conditions of the country—noted for its horse lovers—the increase of four a week in growth is satisfactory.

While motor 'buses are making headway in Melbourne, they are barred in Sydney. The government occupies the main thoroughfares and chief suburban roads for its own tramways, and permission to run motor 'buses cannot be obtained. Throughout Australia all leading distributing firms have adopted motor vehicles as a means of transportation.

POLACK'S NEW FACTORY IN ENGLAND.

The Isleworth Rubber Company, Isleworth, England, maker of the Polack solid tires, has opened its new factory for inspection. The main plant has an area of 200x100 feet, surrounded by the offices, engine and boiler rooms, vulcanizing shops, the laboratory, stores, etc. This plant contains every modern appliance, and all such necessities are supplied by British manufacturers.

The location of the factory is within a few minutes of Isleworth, which is a short distance from London. The output of the entire plant has been secured by the Polack Tyre & Rubber Company, Ltd. F. Poppe is managing director of both companies.

MOTOR INDUSTRY IN QUEENSLAND.

The latest developments in the motor industry in Queensland is that the government has taken over the tramways in the Johnson and Mourilyan districts of the state. It is now proposed to open the sugar cane growing country with the aid of motors, which will be used to convey the produce from the fields to the sugar works.

Before the reduction of Amiens the British destroyed over 100 of their own motor vehicles rather than have them come into the possession of the enemy.

THE MARTELL ALIGNING REAMER.

MODERN machinery and tools have reduced the cost of motor truck maintenance considerably. Many operations in the overhaul of the chassis for-

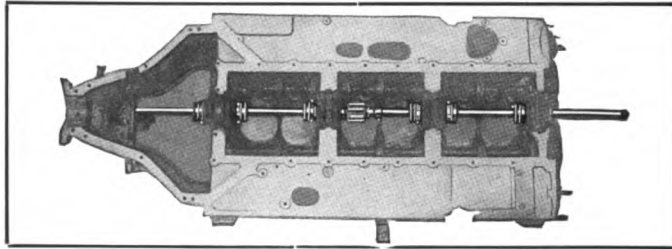


Fig. 1—The Martell Aligning Reamer in Service in Crank Case of a Six-Cylinder Packard Motor—The Tool Eliminates Scraping Bearings by Hand, Assures Perfect Alignment and Saves Considerable Time and Labor.

merly executed by hand, are now accomplished by time and labor saving tools, and the newer methods insure greater accuracy. A job generally performed by hand is the scraping in of the main bearings, an operation that is now done in motor car factories by machines.

Service stations and repair shops will be interested to learn that an aligning reamer, a tool that will successfully compete with any of those in use in large factories, is now being produced by the Harding Manufacturing Company, South Main street, Mansfield, Mass., for which the Harding Distributing Company, Boston, is sole distributor. Not only does the Martell reamer perform the work quickly and accurately, but it assures perfect alignment. One of its several advantages is that it can be utilized on any motor. It produces perfect surfaces in correct alignment with each other, and is equally adaptable to connecting rod and other bearings.

The supporting bushings, shown at Fig. 1 depicting the Martell reamer in service, are provided with a very fine thread on the tapered portion, and screw very firmly into the ends of the bearings to be reamed. They are also provided with means of adjustment in any direction, the range being about .095-inch. They also have a micrometer reading, showing the amount of "set".

The maker states that one or two operations with the reamer will perfect one in its use and that scraping is seldom necessary except fillets. Generally the motor can be left in the frame.

The reamer consists of two heads, each carrying six adjustable blades, the range of adjustment being about .08-inch. The small head takes all sizes from $1\frac{5}{8}$ to $1\frac{7}{8}$ inches, and the large member from two to $2\frac{1}{4}$ inches. This range is obtained by the use of six blades, and it is an easy matter to make any desired change.

The smaller illustration shows the Martell reamer set up in a Packard six-cylinder crank case and reaming out the bearings after the gears have been set correctly and the rear end trued up. This work was com-

pleted in 11 hours without any attempt to make a record. The time was taken from starting to shim the bearings until the main and rod bearings were all reamed, fillets scraped and connecting rods and crankshaft assembled and cotter pinned.

The maker states that the operation of the tool does not require an expert; a workman more or less familiar with bearings and the use of a micrometer can run it. The Martell eliminates the element of uncertainty in estimating jobs for repair work. It is as easy to ream .02 as .002-inch.

Mr. Martell, the inventor of the reamer, is a well known mechanical engineer, who was for several years at the head of the experimental and testing department of the Packard Motor Car Company. He is now with the Harding Manufacturing Company as factory engineer. The company issues a booklet upon the subject of bearings, including data on its reamer, and which will be mailed free upon request.

DRIVER TOOL RACK.

C. H. Driver, Racine, Wis., is marketing the Driver sectional tool rack, which is constructed to keep the cutting tools in order and to prevent the edges from being damaged. The rack is provided with

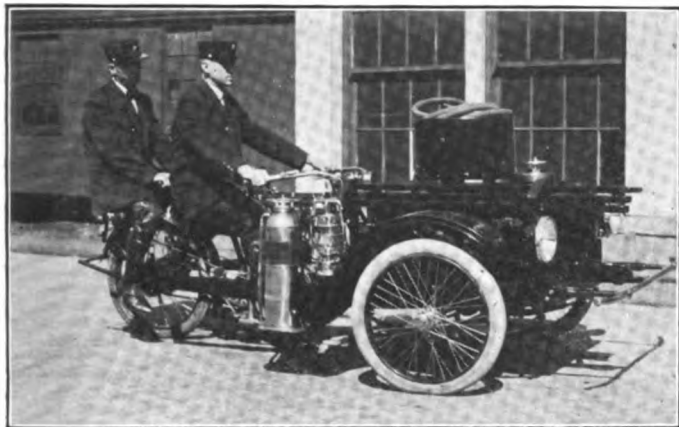


Fig. 2—The Martell Reamer, Including Heads, Adjustable Blades, Etc., Comes in a Neat, Substantial Box.

sections, each holding a certain sized tool. This enables the workman to locate the desired tool quickly. The rack can be attached to the walls, posts, etc.

FEATURES OF DAYTON TRI-CAR CHEMICAL.

THE bane of all rural communities and small towns is fire. Hundreds of thousands of dollars loss is sustained every year in every section of the coun-



Tri-Car with Chemical Apparatus for Use in Fighting Flames in Large or Small Communities.

try because of the lack of fire fighting apparatus. "Hindthought" seems more common than forethought in reckoning with this very vital question. Not until a serious conflagration has wiped out part of a town or village do the citizens awaken to the fact that they are helpless in the hands of the fire fiend, and like the proverbial locking of the door of the stable after the horse is stolen, they set about to organize a fight fighting brigade.

Modern motor fire fighting apparatus is now being built which makes this question an easy one to solve. As an aid to its solution many organizations are lending a hand. The latest to help the matter along is the State Firemen's Association of Pennsylvania, which at its recent convention at the state capital, Harrisburg, passed a resolution to ask the legislature sitting next year to pass a law permitting county authorities to purchase apparatus to fight rural and brush fires.

Many instances could be cited where fire has swept away towns and villages because there was no fire fighting apparatus, and the matter has become such a serious one that it must be taken cognizance of. Motor apparatus manufacturers see what is coming along these lines and are preparing to meet the issue when it comes. The value of such equipment to small towns, rural communities and institutions cannot be questioned.

One of the first firms in the field with such apparatus is the Davis Sewing Machine Company, Dayton, O. This firm has applied for a patent for the Dayton tri-car chemical, which it claims will revolutionize the cost of fire fighting. With the efficiency of a 35-gallon chemical, a possible speed of 45 miles an hour, a small first cost and a very small cost of maintenance, it makes up-to-date motor driven fire apparatus possible for all small communities. This newly designed

tri-car has a frame of great strength, especially made for heavy loads of fire fighting apparatus.

The car is constructed to carry a big chemical tank and hand extinguishers, extension ladders, axe, lantern and other equipment, with a speed of 45 miles an hour with two men and chemical tanks full. On the frame between the two front wheels is mounted a big special Holloway chemical tank of 35 gallons capacity, and on top of this is coiled 200 feet of $\frac{3}{4}$ -inch four-ply chemical hose, carried in a large, round metal can. Two three-gallon hand extinguishers of the regulation fire department pattern are carried at the sides, and a 12-foot extension ladder rides alongside the big tank. An axe with pick head is carried on a suitable bracket, and a fireman's lantern hangs in place on the frame, while in a box are a full set of tools. A reserve charge of soda and of acid allows the apparatus to be recharged, in case the tank is exhausted in fighting an unusually big blaze, by simply refilling the tank with water, dumping the soda charge and later putting in the acid.

The power plant is a nine-horsepower Spacke motor, and the rear part of the machine is practically the same as the Dayton motorcycle—same handlebars, footboard, two-speed gear, control, tanks and similar parts. Any rider familiar with motorcycles could operate this fire fighting machine readily.

Carrying two men and full load of equipment, it is said this machine will make 45 miles an hour.

This model is fitted with a Splitdorf magneto generator, which furnishes current not only for ignition, but for two brilliant electric headlights, tail light and horn. A big locomotive bell is also mounted on the forward deck as a warning signal.

The manufacturer claims there is an immense field of usefulness for such a machine in cities, large or



Front View of the Tri-Car Chemical, Dayton's New Motor Propelled Fire Apparatus.

small, villages, institutions and suburbs, and in the government forest reserves, for which work the speed, high efficiency and economy of the apparatus particu-

larly fits it. Its first cost is no more than the horse apparatus and covers the distance in one-third the time, besides it can be operated in a much wider radius from its station. Its lightness of weight also makes it possible to be taken to a fire in quicker time than the heavier truck, where it could extinguish the blaze while it was still small, which would prevent much fire loss, as well as reducing cost of operating fire department apparatus.

The Dayton tri-car chemical being placed on the market for the first time this year is meeting with great approval. It was on display during the convention of the International Association of Fire Chiefs at New Orleans.

SUBURBAN AUTO DELIVERIES.

A splendid example of the possibilities for long-distance deliveries afforded by motor trucks is being exhibited every day by a 1500-pound machine in America's sixth city.

The city of Cleveland is surrounded by a number of small towns within a radius of 25 to 30 miles, and the merchants of the city derive a profitable patronage from the inhabitants of these smaller places. The big city stores carry a more complete and attractive stock than the merchants of the smaller towns, and the majority of the rural housewives are making their more important purchases in the city.

The Cleveland retail merchants' board believed that more of this foreign trade might be brought to the city if a suitable suburban delivery service could be established, which would relieve the people living out of the city from doing their shopping personally and cut down the cost of delivering packages to a point where it would be profitable for the merchants to make free deliveries of small packages. It was decided to try out motor trucks on this work. Packages to be delivered are collected at a central warehouse and daily at 6:30 a. m. the machine is loaded at this place and starts out making deliveries in Elyria, Loraine, Oberlin, Wellington and intermediate points. The truck covers 60 to 80 miles in a day and is usually back in Cleveland soon after noon.

It is planned that, as this suburban service becomes more popular, a fleet of trucks will be gradually acquired to handle the business.

AWARDED FRANKLIN MEDAL.

The city of Philadelphia, Penn., has awarded the John Scott legacy medal and premium of the Franklin institute to Arthur Atwater Kent for the Atwater Kent Unispartaker and ignition system, the formal ceremony of award to be held on Nov. 18 at the regular meeting of the Franklin institute. This medal and premium was bequeathed by John Scott, chemist, of Edinburg, Scotland, in 1816, in the shape of an endowment to Philadelphia, with the directions that the interest and dividend be distributed annually among

"ingenious men who make useful inventions". In 1834 the award was vested in the Franklin institute. This is probably the first award of such a character made in America to any maker of automobile parts.

TO FRAME NEW AUTO LAWS.

An ordinance regulating the use of the streets of Baltimore, Md., by automobile trucks and also prohibiting machines from showing headlights while standing on the highways is to be prepared for the city council. It will be a general automobile measure. The details are to be worked out by City Solicitor Field, City Engineer McKay and a committee representing owners and operators of trucks. Owing to complaints on the part of citizens of noises made by the trucks, several streets of the city have been set aside for their moving to and fro. The new ordinance will also regulate the use of headlights on automobiles within the city limits. Flaring lights will be prohibited, as in other cities.

AUTOS AFFECTING HORSE TAX.

The increasing use of motor vehicles is making itself felt in the horse and mule tax receipts in Connecticut. In 1913, 73,819 horses and mules, valued at \$5,339,126, were taxed in that state. This is a decrease of 2711 animals in four years, but the value increased \$607,788, or \$9 a head. The value of wagons, motor vehicles and bicycles doubled in the four-year period, increasing from \$6,409,534 in 1909 to \$16,493,639 in 1913.

TRUCK FOR POWER SPRAYER.

A motor truck for a power sprayer to be used for fighting brush fires is recommended by City Forester Page S. Bunker of Fitchburg, Mass., who is also a fire warden. Several Massachusetts towns have a small motor propelled machine to tackle brush fires and much standing timber has been saved from destruction by its rapid movement to the fires and the quick extinguishing of the flames.

MCCULLA JOINS THE KNOX FORCES.

W. R. McCulla, formerly research manager of the Packard Motor Car Company, Detroit, Mich., has joined Frank Trego, who was also in the Packard engineering corps, but is now assistant general manager of the Knox Motors Company, Springfield, Mass. Mr. McCulla will be in charge of all experimental work and will act as assistant to Mr. Trego.

WILLYS-OVERLAND DIVIDEND.

The Willys-Overland Company, Toledo, O., has declared a regular quarterly preferred dividend of 1 $\frac{3}{4}$ per cent., payable Oct. 1, to stock of record Sept. 22.

HINTS FOR PROPER MAINTENANCE.

AN ATTACHMENT for use on a vertical milling machine and which is held to be very efficient for boring odd work, is described in a recent issue of

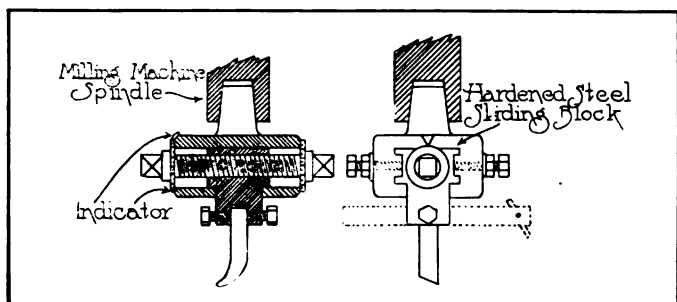


Fig. 1—Illustrating Boring Attachment Adaptable to a Vertical Milling Machine.

Commercial Motor, an English publication. The inventor of the attachment was awarded the first prize in the competition conducted by the publication. The device comprises an adjustable boring tool, which is capable of machining holes from $\frac{1}{4}$ to six inches in diameter, or even larger.

The body of the attachment consists of a circular mild steel blank, which is provided with an extension to suit the taper of the spindle of the milling machine. The blank is slotted to take a hardened steel sliding block, which is threaded to suit a screwed spindle to provide the tool's adjustment. Two collars are utilized to locate this spindle, and they also serve to take up end thrust.

On the spindle are fixed two indicator dials, and a brass pointer is suitably mounted on the body, so that the workman can note the distance the tool block is being advanced. To act as a check on the position of the sliding block, one or two small set pins are screwed on each side of the blank. Their position is shown in the right hand illustration at Fig. 1. They also serve the purpose of keeping the tool rigid when when the cut is being made, as the least movement would affect the work in hand.

Into the bottom of the block is drilled a blind hole to receive the tool, which must, of course, be a good tight fit. The cutting tool is still further secured in position with the aid of a couple of set screws. The dotted lines in the drawing at the right indicate how a fly cutter may be attached in place of the ordinary boring bar.

JOINING ROLLER CHAINS.

The joining of roller chains after they have been replaced on the truck is not always an easy matter, especially if the chain is of large pitch. A driver makes a good suggestion for joining the ends when a tool for this work is not handy, as when making an emergency repair on the road, for example.

The equipment consists of a piece of tough rope of sufficient diameter to allow its passing through the

open spaces in the chain. A small bolt is tied to one end of the rope and passed through a link nearest the joint, as illustrated in the drawing at Fig. 2. The rope is then threaded as shown.

Any slack in the upper part of the chain can be eliminated by moving the car along with a speed engaged. The rope is then tightened, and, by its acting as a pulley block, the other end of the chain will be brought into such a position as to enable fitting the master link into place. A wire cable could be used for the same work.

STORING SMALL PARTS.

Any arrangement saving time and labor in the maintenance of the motor vehicle should be adopted. The practise of storing small parts, such as nuts, bolts, etc., in a drawer with other similar material, results in a loss of time when a particular piece is required, and to locate it generally involves the dumping of the contents of the box or drawer upon the work bench. The better method is to make a small cabinet, and this may be constructed of light material. By arranging a number of compartments, of the proper dimensions, cigar boxes can be used for the drawers. By fitting a small, inexpensive handle, and by labelling each box, cotter pins, lock washers, etc., may be quickly located. The arrangement has the advantage of enabling the workman to note at a glance the stock on hand.

A CARBURETOR HINT.

Some old types of carburetor are not provided with petcocks for draining the float chamber, which compels dismantling when the presence of water is suspected. It is a simple matter to arrange a drain. Remove the carburetor and take out the float to prevent injury to it. Next drill a small hole, $\frac{1}{8}$ or $\frac{3}{16}$ -inch in diameter, in the lowest part of the float chamber. The opening is then tapped to take a machine screw. Before beginning the work consideration should be given to accessibility of the screw member; that is, the screw should be so located that it can be reached

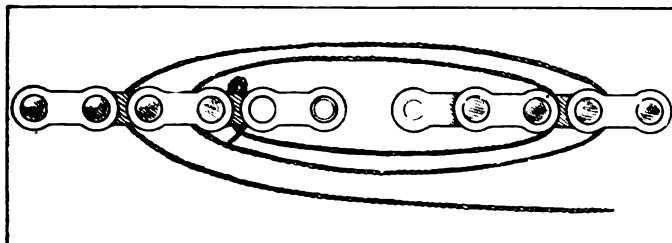


Fig. 2—Suggestion for Utilising a Rope to Draw Ends of Roller Chain Together.

and removed easily. The hole should be tapped carefully and the screw should be a good fit to prevent leakage of fuel. A fine threaded screw is preferable.

MAINTENANCE OF BRIDGES.

English Court Rules Railroad Is Responsible for Highway Structures.

The responsibility of the railroads of England has, by a decision in the high court of the United Kingdom in the action brought by the attorney-general in behalf of the public, which action was begun at the instance of Pickford's, Ltd., a very large haulage contractor, been established with reference to the maintenance of highway bridges that cross tracks. This is a matter of great importance, in that the claim was made by all of the railroads that by posting notices on the bridges that were not of sufficient strength to withstand heavy motor traffic, specifying the weights that could be carried by vehicles crossing the bridges, the companies were relieved of responsibility for accident and for whatever consequences might result were the specified weights exceeded. This meant that the bridges existing need not be improved or replaced so long as they were kept in reasonable repair, no matter what the exigencies or the requirements of highway traffic, and the public had no redress so long as the railroads were disposed to post notices.

There was reason to believe that the railroad companies hoped to materially profit by the interpretation placed upon the law, because of the limitations of the loads that might be carried by highway, and by an endeavor to make the public defray the expense of replacing a very large number of bridges that had originally been constructed by the railroads. The decision was in effect that there was no legal exemption of a railroad company from its responsibility to maintain bridges according to the nature and extent of the traffic upon and to be expected upon the highway of which a bridge forms a part.

In connection with this decision it may be said that the heavy motor traffic in different parts of the country had been interrupted materially by weak bridges and notices posted that prohibited crossing them with capacity loads, this affecting the work of many owners to a considerable extent and decidedly interfering with business transactions.

WAR AND TRADE DISCUSSED BY I. A. E.

A paper entitled, "Automobile Engineering and the War" was presented at the last meeting of the Institution of Automobile Engineers, London, by L. H. Pomeroy. One of the features of the paper dealt with the substitution of British made parts and accessories for those formerly secured on the continent. Mr. Pomeroy proposed that a committee be appointed to ascertain what could be done in the way of promoting scientific research along the line laid down in the large continental factories.

In conclusion, Mr. Pomeroy pointed out the neces-

sity of increasing the production of commercial vehicles for warfare, and also the fallacy of using passenger vehicles for commercial work.

BUILDING FIELD OMNIBUSES.

The Standard Arms Manufacturing Company, Wilmington, Del., is making motor vehicles and, under sub-contract with the Field Omnibus Company of New York City, has just delivered a 28-passenger motor 'bus to the Springfield Transit Company, Springfield, Mass. The power is furnished by a gasoline engine, with electric generator and electric motors driving the wheels. This is the company's second machine.

RAIN DRAWBACK TO EASTERN MARKET.

The agent of an American motor firm who has returned from the Far East, says the worst enemy to the successful marketing of automobiles in Japan is the heavy rainfall. An almost incessant downpour keeps the roads in poor condition most of the time, and as a result the Japanese who can afford to buy automobiles have little desire to travel. For these reasons the proportion of the people who might purchase cars is much smaller than it is in the United States.

NEW STYLE SAFETY ZONE POSTS.

The Detroit, Mich., police department has a plan for the use of disappearing safety zone posts. These posts would be in shape of iron standards, and would fit in an iron casing embedded in the streets. The advantage claimed for this plan is that the traffic officers could raise and lower the posts at will. The plan is to attach chains to the posts, but in event of a parade or any special event, the streets can be entirely cleared.

CHALFANT ELECTED SECRETARY.

E. P. Chalfant, who at one time was general manager of the Association of Licensed Automobile Manufacturers, has become secretary of the Electric Vehicle Manufacturers' Association, comprising a group of electric pleasure car makers, and will establish association headquarters at either Cleveland or Chicago.

PACKARD HAS \$1,797,820 SURPLUS.

For the last fiscal year the Packard Motor Car Company, Detroit, Mich., earned a surplus of \$1,797,820, according to its annual report. This is an increase of approximately \$600,000 over the previous year, and constitutes the final surplus after deducting all expenses, depreciation, interest, dividends, etc.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXVII—The Swiss Magneto, in Which the Distributor Is Located Over the Driving End of the Armature Shaft, and the Intensified Current Is Collected by a Carbon Brush in the Distributor Plate.

By C. P. Shattuck.

AN ANALYSIS of the more recent types of magnetos indicates the tendency of the manufacturer to provide a more compact instrument and to protect it thoroughly from the weather and foreign elements. Not only are the working parts proof against water and road dust, but the components requiring attention in service are easily accessible. A noticeable feature of the new designs is the use of indicating or timing windows, a construction facilitating the installation or replacement of the magneto, especially by the inexperienced.

A number of makers now utilize the indicating window, these including the Bosch, Splittdorf, Eisen-

sents the driving end of the instrument, also the distributor end, the magneto differs from the types pre-

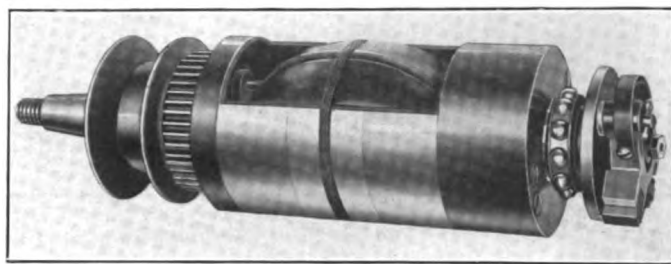


Fig. 169—The Swiss Armature, Showing Collector Ring, Pinion and Cap at Right End, Covering Condenser.

viously described in that the distributor plate is located on the driving shaft end.

Generally this part of the instrument is clean; that is, there are no arrangements other than the provision made for connecting the shaft with the driving member. In the Swiss magneto the distributor plate is placed at the rear of the instrument and, following conventional practise, the circuit breaker or interrupter mechanism is at the front.

The maker of the Swiss states that this form obtains a water proof construction without armoring, and that all cross wiring is eliminated, as well as parts generally subject to the disturbing influences of moisture, etc.

Collector Brush Location.

One of the features of the Swiss magneto is the location of the carbon brush collecting the high-tension current. The method is illustrated at Fig. 171 and, as may be noted, the distributor plate carries a carbon brush, which makes contact with the collector ring. The last-named member is located in the conventional manner, and proper contact with it by the carbon brush is obtained by the use of a spring in the brush holder of the distributor plate.

That the distributor plate is easily removed is in-

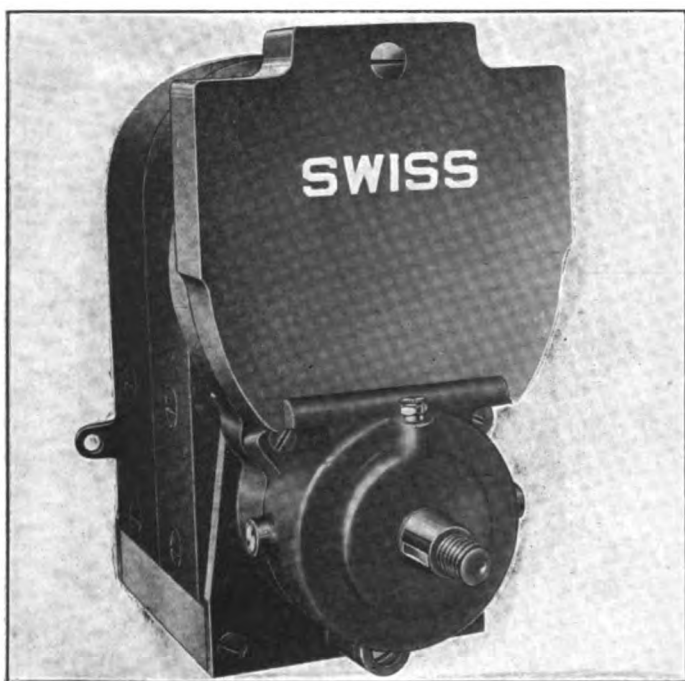


Fig. 168—Type E4F Swiss Magneto, a True High-Tension Instrument Differing from Conventional Practice in That Distributor Is Located on Driving End.

mann, etc., which types have been discussed in previous installments. Such an arrangement generally provides the timing window in the distributor plate, and indication of the terminal in circuit with the distributor brush is by a figure on the distributor proper.

How Swiss Differs.

A magneto that differs from conventional design in the arrangement of the indicating device, also the location of the distributor, is the Swiss, manufactured by the Swiss Magneto Company, Chicago, Ill., shown at Fig. 168.

As may be noted by the illustration, which pre-

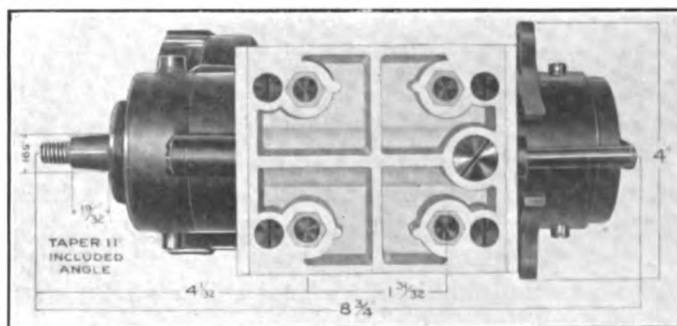


Fig. 170—Base and Overall Dimensions of the Swiss Magneto.

licated in the illustration. The plate is retained in position by a single screw, and the maker states that it is fitted so accurately that it is impossible for water

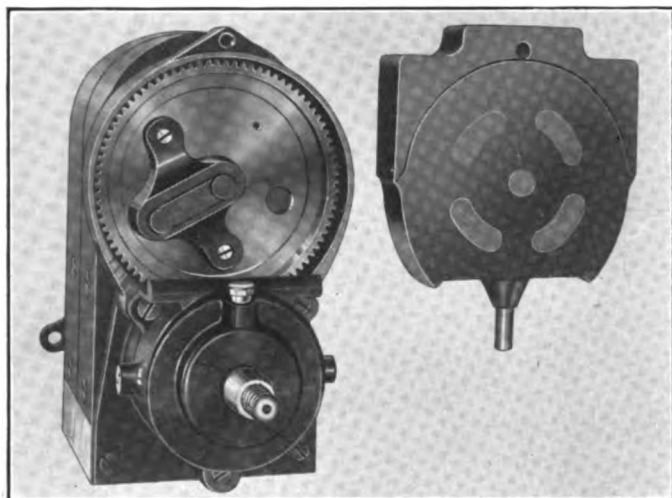


Fig. 171—Swiss Four-Cylinder Clockwise Magneto with Distributor Plate Removed—Note the Carbon Collecting Brush Located in the Plate.

or road dust to penetrate to the interior of the distributor.

The provision for timing the magneto differs from the general method employed in that letters are utilized to indicate when the armature shaft is in the proper position and the distributor brush making contact with the plate in circuit with the terminal leading to the No. 1 cylinder of the motor.

As may be noted by the illustration at Fig. 172, which depicts the interrupter end of a clockwise, four-cylinder instrument, a letter R appears in the indicating window under the magnets. When in the position shown, the armature shaft is properly located and the instrument ready to supply current to the spark plug of the first cylinder of the motor. A ring indicates this connection, and the order in which contact is made with the other terminals is indicated by the number of rings shown. This arrangement greatly simplifies matters when installing or replacing the magneto by the novice.

Anti-Clockwise Magnetos.

With an anti-clockwise instrument, the letter L appears in the window, and the contact by the distributor brush with the first and third terminals is the same as with the clockwise magneto, but numbers two and four are reversed. The factor of the firing order of the motor is considered in the attaching of the cables to the terminals of the distributor plate.

Eliminates Switch.

Another departure from conventional practise is the elimination of a switch with the Swiss magneto. The control of the primary current generated is by the spark lever on the steering wheel. The circuit breaker housing provides variable ignition and, with the timing lever fully retarded, the primary current is diverted in practically the same manner as if a switch were utilized and the circuit closed.

As may be noted by referring to Fig. 172, the dust

cap or cover of the circuit breaker housing is provided with a metal spring, which makes contact with the hexagonal headed screw employed to retain the interrupter mechanism. Normally, no current passes from the screw through the spring but, upon fully retarding the timing lever, a projection of the spring contacts with a post just below the interrupter, providing a ground circuit for the primary current. This cuts off the supply of current to the spark plugs in the same manner as moving the switch lever to the "off" position.

The maker states that it not only eliminates the switch and wiring, but makes for convenience in starting and stopping the motor. If, however, a switch is preferred, the dust cap is provided with a terminal for a ground wire connection.

True High-Tension Instrument.

The Swiss magneto is a true high-tension instrument, and is produced with single and double magnets to meet the requirements of different motors. The D types have double magnets and are recommended for motors of 35 horsepower and above. The single-cylinder designs are indicated by the letter E. The company produces one, two and four-cylinder instruments, both for two-cycle and four-cycle engines.

The Swiss armature completely assembled is shown at Fig. 169, and rotates on ball bearings. The condenser is located under a brass cap at the right hand end. The maker lays great emphasis on the accuracy of the workmanship, stating that the opening in which the armature revolves is only .007-inch larger than the diameter of the armature, leaving a clearance

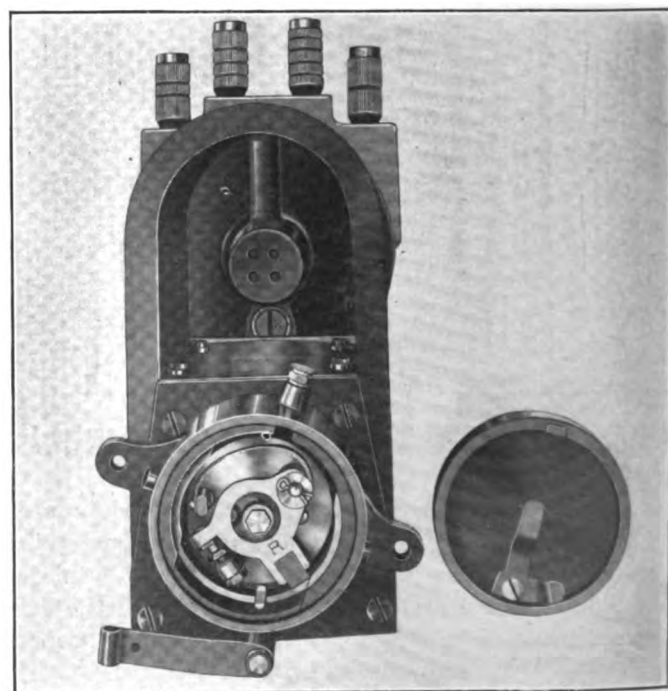


Fig. 172—Showing the Interrupter End of Swiss Magneto and Indicating Window with Letter R, Denoting Armature Shaft in Proper Position for Attaching Driving Member to Shaft.

of .0003-inch between it and the pole pieces.

The Swiss interrupter for both right and left hand driven magnetos is shown at Fig. 173. It is attached

to and revolves with the armature shaft, and separation of the platinum contact points is obtained by a fibre block contacting with metal segments in the in-

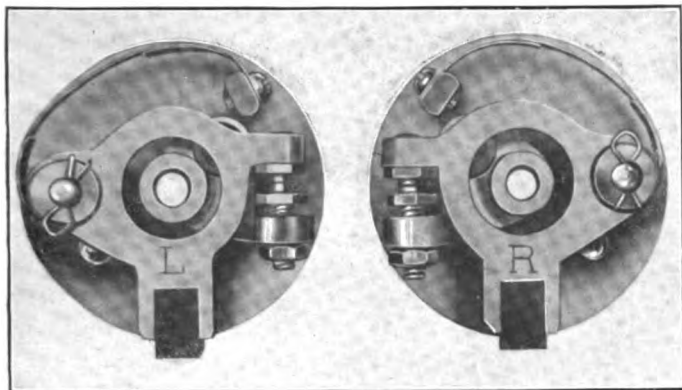


Fig. 173—Depicting the Swiss Clockwise (R) and Anti-Clockwise (L) Interrupter.

terrupter housing. The design is simple, and the spring is of sufficient length to provide positive engagement of the contact points without undue pressure of the metal. The contact points follow conventional practise in that one is a fixed member in the interrupter lever, while the other is adjustable by means of a screw retained by the usual lock nut.

The dimensions of the Swiss magneto show a length of $8\frac{3}{4}$ inches from the end of the tapered shaft to the end plate. The width is four inches and height $6\frac{5}{8}$. Emphasis is placed on the high-grade workmanship and material employed. All stock types of Swiss magnetos are constructed to be driven at crankshaft speed. (To Be Continued.)

PEERLESS TRUCK HAS LARGEST CRANE.

The department of public works, Detroit, Mich., has met an extremely difficult traffic problem in the garbage department in that city by the use of a special Peerless six-ton truck. This truck, made by the Peerless Motor Car Company, Cleveland, O., is equipped with a crane capable of lifting $2\frac{1}{2}$ tons, the largest ever placed on a truck. The garbage of the city of Detroit is carried on open coal cars to the plants of the Detroit Reduction Company, outside of the city. There are only a few sub-stations at which the cars can be loaded, as property owners in the vicinity object to them, and in many cases have forced the abandonment of newly opened stations. This makes a long haul to the sub-station unavoidable. It was found impracticable to use motor trucks for the actual collection of garbage owing to the frequency of the stops necessary to load a ton of garbage. When horse wagons were used exclusively the long haul with the empty or fully loaded wagon would often take from two to three hours. The wagons in many cases were able to make only one trip a day.

John Knight, superintendent of the garbage and street cleaning department, solved the problem by the purchase of the special Peerless six-ton truck. Garbage wagons from the different sections of the city are met on the way to the sub-station and their two-ton loads are lifted off on to the truck by the crane. An empty box is hoisted from the truck to the wagon to be refilled. One wagon now collects two loads in the time that was formerly required to collect one. In the case of the break down of a garbage wagon on the streets, the truck picks up the load and removes it at once, thus avoiding the very undesirable necessity of shovelling the garbage from one wagon to another.

KISSELKAR TRUCK WITH REFRIGERATOR.

The Kissel Motor Car Company, Hartford, Wis., has built a 1500-pound truck for the Edgewood Farms, Newport, Minn., which is equipped with a refrigerator to insure keeping cool and sanitary the milk both bottled and in cans which this truck carries. The body is of the panel type and is constructed of sheet steel and, besides being rigid, is of pleasing lines.

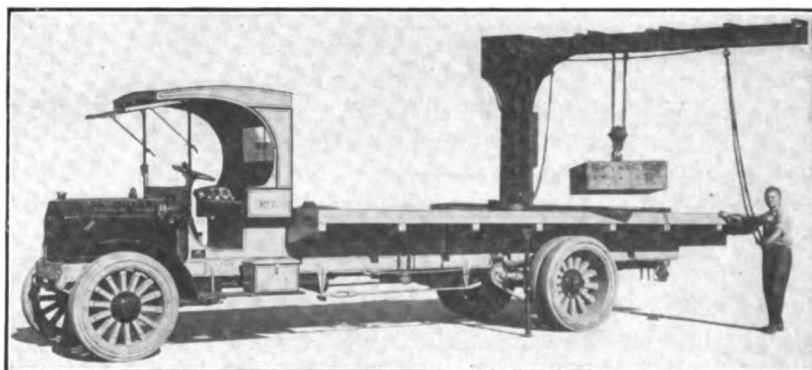
The refrigerator is located directly beneath the roof. It is supported by uprights at its rear side, which also act as supports for the shelves which are placed beneath the refrigerator. The latter is zinc lined and, as a further protection against radiation, is enclosed on all sides with several inches of charcoal. Its capacity is 300 pounds of ice.

CEDAR RAPIDS GETS POLICE TRUCK.

The city of Cedar Rapids, Ia., has purchased a Willys Utility patrol wagon, similar in design to the large fleet now being operated by the New York City police department.

WHITE MOVES JEWELRY STORE.

Two White trucks, made by the White Company, Cleveland, O., moved an entire jewelry store from New Haven to Hartford, Conn. The stock, fixtures,



Peerless Six-Ton Truck, Fitted with One of the Largest Cranes Ever Put on a Truck, Operated by the Detroit, Mich., Department of Public Works.

etc., were moved expeditiously with no trouble and little expense compared with the railroad cost for the same work.

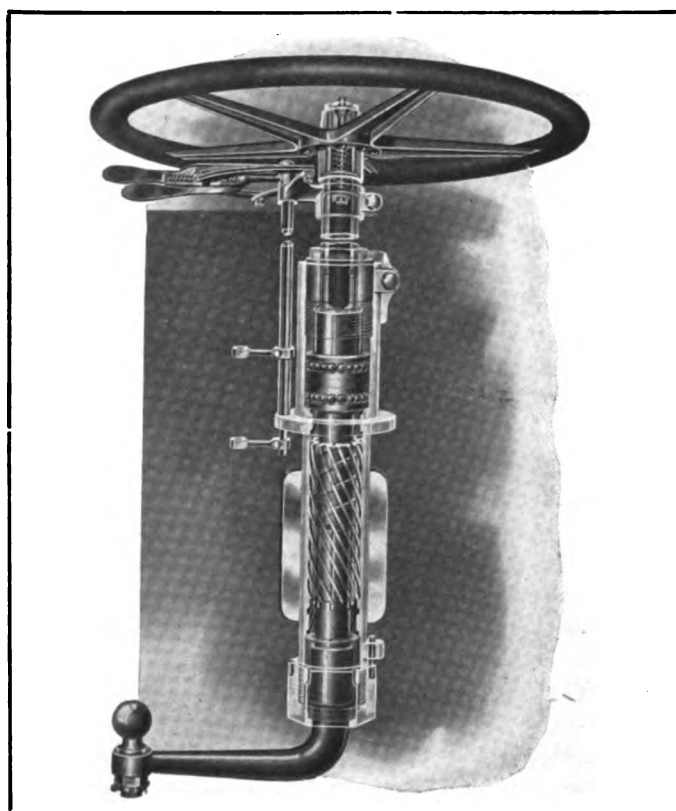
CORRESPONDENCE WITH THE READER.

Steering Gears—Reader, Waterbury, Conn.

Will you give me some information as to the construction and operation of the Ross steering gear of which you speak so highly in one of your recent issues? Is there any difference in the gears; that is, does one have to turn the steering wheel more with a heavy truck than with a light one, one weighing say a ton?

A sectional view of a Ross steering gear, made by the Ross Gear & Tool Company, Lafayette, Ind., is shown in an accompanying illustration. All of the gears made by this company have the same features of construction.

The steering wheel is tapered and keyed to the tube, and the lower end of the last named member is made integral with the steel screw by means of a brazed joint. This screw, when turned by the wheel,



Sectional View of Ross Steering Gear Showing Arrangement of Components.

gives a phosphor bronze sleeve longitudinal motion. The sleeve, which is threaded to receive the steel screw, has spirals milled upon its external surface. These spirals have a very rank lead in comparison with the threads on the steel screw.

Therefore, when the sleeve is given longitudinal motion by the steel screw, it is also given rotative motion by the spirals on its exterior. The sleeve, in addition to being interiorly threaded, contains a number of straight interior keyways. The lower steering arm, which projects half way up into the gear, has keys milled on its surface, so that when the sleeve is given rotative and longitudinal motion, it rotates the steering arm.

The difference in the pitch of the threads on the steel screw and of the spirals on the sleeve causes the

gears to be semi-irreversible in their action. The heavier the gear the more irreversible this action is. As the strength of the driver cannot be increased, this additional ratio enables him to handle heavier trucks with ease.

The standard steering wheel is constructed of a pressed steel spider, screwed to a hub, which is turned from bar stock, and its rim is enveloped by a continuous wood cover, making for extreme strength. The external telescoping type of spark and throttle controls is employed. A V shaped notch is cut in the edge of the sector, and a fibre plunger is backed by a spring, which retains it in place. The lubricator is located in the nut on the top of the steering wheel, and is held down by a spring. Lifting the plug permits of the introduction of the lubricant into the tube. A hole machined in the lower end of the tube just above the thrust bearing enables the lubricant to reach the interior of the gear.

The gears utilized with three, four and five-ton motor vehicles have a reduction of 12 to one, and three turns of the wheel are required to rotate the steering arm 90 degrees. Those employed with one to two-ton trucks have a reduction of nine to one, and $2\frac{1}{4}$ turns of the wheel are necessary. The design applicable for service with 1000 and 1500-pound vehicles has a gear reduction of seven to one, and $1\frac{1}{4}$ turns of the wheel are required.

A postal addressed to the Ross Gear & Tool Company, Lafayette, Ind., will bring an illustrated catalogue explaining fully the gears made by this company.

Lamps Flare—Reader, Davienville, R. I.

Is there anything on the market to regulate the blaze of the acetylene headlights? We use a converted pleasure car for trucking, and in turning on the gas tank the flame flares, requiring several adjustments before we get the right blaze.

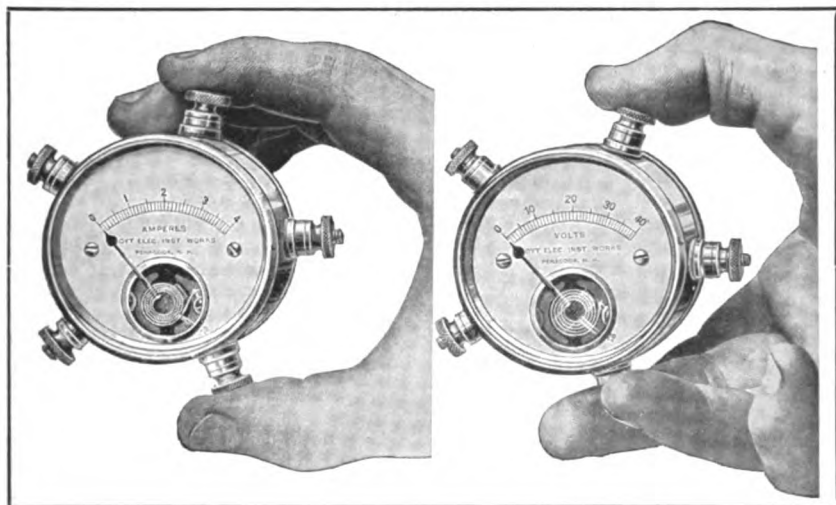
There is a device for controlling the flow of the acetylene. It is manufactured by the maker of the Prest-O-Lite and can be obtained at any of the branches maintained by the company, a list of which will be found in the Buyers' Guide, published elsewhere in this issue.

The regulator is automatic in its action, is easily attached to the tank, and controls the supply of acetylene to the lamps. The operator may open the valve slightly or to its maximum without affecting the flow of gas, and the regulator is as effective with a tank almost empty as a full one. The device not only eliminates waste of gas, but prevents damage to the mirrors of the lamps caused by flaring. The Prest-O-Lite regulator is not expensive.

The Lauth-Juergens Motor Truck Company, Fremont, O., has appointed Charles Fisher, formerly connected with the Universal Motor Truck Company, its sales manager.

HOYT POCKET MULTIMETER.**SEBASTIAN LATHE.**

The Hoyt Electrical Instrument Works, Penacook, N. H., maker of the well known Hoyt ammeters



Hoyt Pocket Multimeter, a Separate Voltmeter and Ammeter Combined in a Single Case in Such Relation to Each Other That Either One or Both May Be Used.

and voltmeters, has brought out an entirely new form of current measuring instrument, called the Hoyt pocket multimeter. It comprises a separate voltmeter and ammeter in a single case, two instruments in one. These are mounted back to back in a case with both front and back surfaces of heavy plate glass. The device is but $2\frac{1}{4}$ inches in diameter and $1\frac{1}{4}$ inches thick.

One of the desirable qualities of the multimeter is that it permits both voltage and current measurements being taken simultaneously, not practical with the conventional type of pocket volt ammeters. The new instruments are of the D'Arsonval moving coil type, have jewel bearings throughout, and are built all the way through like a watch.

The convenience of the multimeter is apparent. It permits either the ammeter or voltmeter side to be utilized independently, or simultaneously without influencing the other. By this arrangement it is possible to obtain a three-range ammeter and a three-range voltmeter, providing a flexibility of scale values not heretofore obtainable outside of large laboratory instruments.

Two, three and four-range types are offered. Combination of ranges between one and 40 volts and one and 40 amperes can be built in the multimeter. For ranges above 40 amperes, external shunts can be supplied for use with the millivoltmeters. These are particularly useful for testing automobile starting motors, as well as for many other tests where heavy currents of low voltage are used. Complete details and prices of the new instruments will be supplied upon request. The Hoyt Electrical Instrument Works also produces current measuring instruments to meet all requirements.

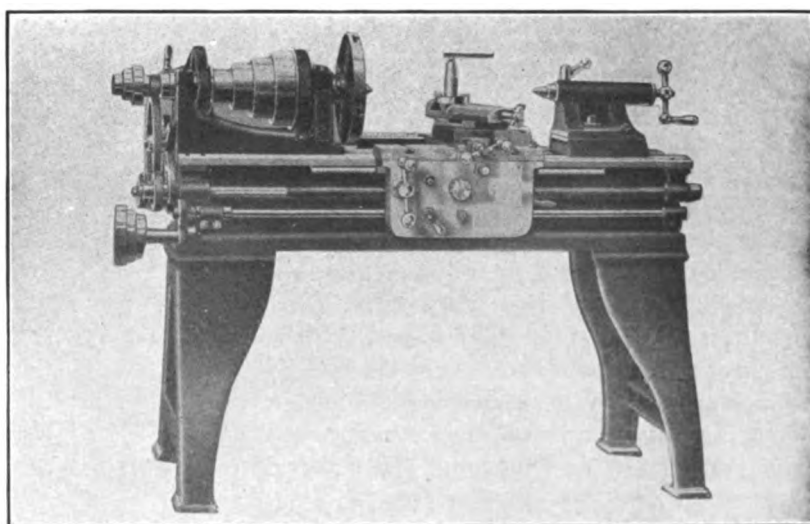
The Sebastian Lathe Company, Cincinnati, O., specialist in lathes and equipment, is producing a 15-inch lathe especially designed for motor vehicle work. Convenience, rigidity and strength are qualities of the machine, which has screw, rod and power cross feeds, and cuts standard threads with furnished gears from five to 36.

The dimensions are as follows: Swings over bed, 15 inches; swings over carriage, $9\frac{1}{2}$ inches; length of bed, six feet; takes between centres, 40 inches; front bearings, $2\frac{3}{16}$ by $3\frac{1}{2}$ inches; diameter of spindle nose, eight inches; hole through spindle, $1\frac{5}{16}$ inches; centres, Morse taper No. 3; size of tools, $\frac{1}{2}$ by one inch; ratio of back gearing, $7\frac{1}{2}$ to one; diameter of tail spindle, $1\frac{9}{16}$ inches; compound rest travels, $4\frac{1}{4}$ inches; capacity of centre rest, $3\frac{1}{2}$ inches.

The cones are $3\frac{1}{2}$, five, $6\frac{1}{2}$ and eight inches in diameter, and the width of the driving belt is two inches. The weight is 1200 pounds. A taper attachment is furnished, also a set of 10 tools. A hand rest, extra gears and chuck plate are listed extra. Complete details and prices will be supplied upon request. The Sebastian Lathe Company issues a most complete catalogue describing its product, which will be mailed free.

MIRRORED TRUCKS IN NEW JERSEY.

Beginning with Jan. 1, 1915, all motor trucks in New Jersey must be fitted with mirrors to enable the drivers to see the road back of the truck. The rule

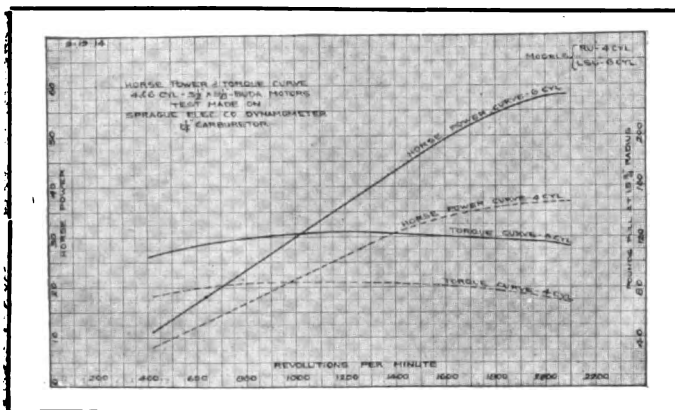


Sebastian 15-Inch Engine Lathe, Particularly Adapted to the Repair of Motor Vehicles.

was made necessary by the protected position of the driver, who is unable to see behind and to realize when another vehicle passes from the rear.

BUDA COMPANY BRINGS OUT NEW MOTOR.

THE Buda Company, Harvey, Ill., has paid especial attention to the feature of accessibility in the design of its new motors recently announced, but the



Horsepower and Torque Curves of New Buda Six and Four-Cylinder Buda Motors.

specifications given indicate that no sacrifice has been made in any point of construction.

The four-cylinder model RU is $3\frac{1}{2}$ -inch bore by $5\frac{1}{8}$ -inch stroke, and shows a maximum power production at slightly over 2000 revolutions a minute. The design is the unit power plant type, but a plain crank case will be furnished if desired. Three-point suspension is used, the rear end of the crank carrying, as an integral part of the casting, the supports for attachment to the side members of the frame, and the forward end resting on a suitable trunnion bracket carried on the dropped cross member.

The valve construction is novel, the springs, guides and push rods being mounted in a dust proof compartment communicating with the crank case to allow lubrication by splash from the cranks. One and one-half-inch valves with hardened stems are employed, and both the stems and push rods are mounted in separate removable bushings, the removable valve enclosure permitting easy access for adjustment and inspection.

The crank case is of aluminum alloy, cast in two pieces, the upper of which carries the crankshaft bearings, the lower half serving as an oil pan and being equipped with removable pressed steel dipper trough, into which the connecting rods dip. The crankshaft is drop forged to open hearth steel, heat treated, and is carefully machined and balanced on a Norton balancing machine. The front bearing is $1\frac{3}{4}$ inches in diameter by $2\frac{7}{8}$ inches long, the centre bearings two inches in diameter by $2\frac{1}{4}$ inches long, and rear bearings $1\frac{7}{8}$ by two inches, these exceptionally large bearings greatly reducing the bearing pressure to the square inch. The cams and camshafts are one-piece drop forgings of open hearth steel, with large cam surfaces, insuring quiet action. The pistons are very

long, carefully machined and fitted, and as light as possible to reduce inertia. A special mixture of gray iron is used. I beam connecting rods, forged of high-carbon open hearth steel, and carefully balanced to a certain weight, are used. The timing gears are helical, cut on a special hobbing machine, and designed especially for quiet running.

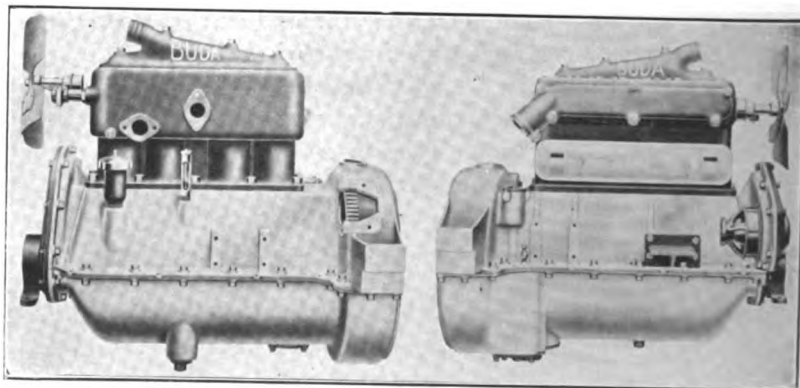
The lubrication is by a positive feed gear pump, which takes the oil from a reservoir under crank case, and feeds to the main bearings, which are pocketed, the overflow running to a constant level dipper trough in the bottom half of the crank case, into which the connecting rods dip. The timing gears are also fed by a constant stream from the pump. Both the oil pump and strainer are removable without disturbing the other parts, and the supply of oil in the reservoir is always shown by an indicator adjoining the filling and breather tube.

It will be seen that a great deal of care is exercised, both in the design and construction, to insure the proper balance and adjustment of all the moving parts, insuring not only a quiet and smooth running motor, but an absence of the many troubles which arise from excessive vibration. For this reason the engine is particularly satisfactory when operated at high speeds and may be employed to advantage under conditions where speed is of importance.

The six-cylinder motor, model LSU, follows the specifications given in all particulars and, under the conditions in which a six is commonly used, its adaptability to high speeds will perhaps prove of even greater importance.

Both the intake and exhaust sides of the model RU are shown herewith, as well as curves plotted from actual tests and showing graphically the horsepower and torque developed by both motors through a long range of speeds.

To facilitate the use of the Buda motor in connection with other equipment, provision has been made



Intake and Exhaust Sides of Buda Four-Cylinder Motor, Which Is Noticeable for Its Compactness.

for the attachment of most of the standard starting, lighting and ignition systems. The motor is carefully finished throughout, and its appearance is clean cut.

AMERICAN STATUS ON TRUCK EXPORTS.

Government Official States Neutrality Policy Is Not Affected by Selling Motor Vehicles to Nations at War—Material Is Contraband However.

A TOTAL of 784 trucks, valued at \$1,181,611, is the story of America's truck exports for fiscal year ending June 30, 1914. While this is a creditable showing indeed, yet the orders from belligerent nations during the past month have exceeded this entire year's figures by 500 per cent. Conservative estimates place the orders for armored trucks at 3300 to 3500 during the past 30 days.

In this connection it might be stated that apparently considerable misapprehension exists concerning the effect of the United States neutrality status in regard to the selling of merchandise to the belligerent countries. Robert Lansing, acting secretary of state at Washington, has issued an official announcement which should clarify the business atmosphere. This makes it clear that commercial transactions between the warring governments of Europe and private citi-

zens of the United States in no way affect the neutrality of this country, even if arms and ammunition are involved.

any article of commerce which he pleases. He is not prohibited by international law, treaty provision or United States statute. It makes no difference whether the articles sold are exclusively for war purposes, such as fire arms, explosives, etc., or are food stuffs, clothing, horses, etc., for use of army or navy of belligerent.

"Furthermore, a neutral government is not compelled by international law, by treaty or by statute, to prevent these sales to a belligerent. Such sales, therefore, by American citizens do not in the last affect the neutrality of the United States. It is true that the articles mentioned are considered contraband, and are, outside the territorial jurisdiction of a neutral nation, subject to seizure by an enemy of the purchasing government.

"It is the enemy's duty, however, to prevent the articles reaching their destination, not the duty of the

Table Showing Number and Value of American Trucks Exported During Current Fiscal Year.

Country	No.	Value	Country	No.	Value
Europe	249	\$248,716	Brazil	13	20,449
England	203	189,099	Chili	2	10,743
Germany	24	18,462	Uruguay	1	806
France	2	5,070	Venezuela	12	28,228
Russia	2	5,322	Peru	3	5,301
Sweden	1	900	Asia	30	55,658
Italy	1	1,229	India	7	12,091
Austria-Hungary	3	7,455	Straits Settlements	7	14,381
Norway	2	3,852	Dutch East India	7	14,323
Netherlands	1	1,452	China	7	12,700
Finland	1	1,452	Japan	1	900
Portugal	8	12,075	Turkey	1	1,354
Greece	1	1,800	Oceania	113	171,407
Turkey	1	2,000	Australia and Tasmania	32	37,378
North America	298	558,413	New Zealand	39	61,599
Canada	247	474,724	Philippine Islands	38	64,905
Cuba	19	33,500	French Oceania	4	7,625
Mexico	12	17,509	Africa	15	16,606
Central American Republics	13	17,814	British South Africa	12	11,539
British West Indies	4	11,250	British West Africa	1	1,260
Other North America	3	3,616	Portugal	1	2,604
South America	79	130,811	Canary Islands	1	1,203
Argentine	48	65,225	Grand total	784	\$1,181,611

zens of the United States in no way affect the neutrality of this country, even if arms and ammunition are involved.

While the statement did not come within the scope of the official announcement, yet it is said, in diplomatic circles, that the shipment of gold and loans by American bankers or other persons to belligerent countries were not in violation of the neutrality code of this country. However, all such shipments are liable to seizure, while in transit, as contraband of war.

The reports of the past few weeks regarding the heavy sales of American motor trucks to England, France and Russia, caused considerable speculation as to the effect of this action on President Wilson's neutrality attitude. In his official statement, Acting Secretary Lansing said: "In the first place it should be understood that, generally speaking, a citizen of the United States can sell to a belligerent government

nation whose citizens have sold them. If the enemy of the purchasing nation happens for the time to be unable to do this, that is for him one of the misfortunes of war; the inability, however, imposes on the neutral government no obligation to prevent the sale.

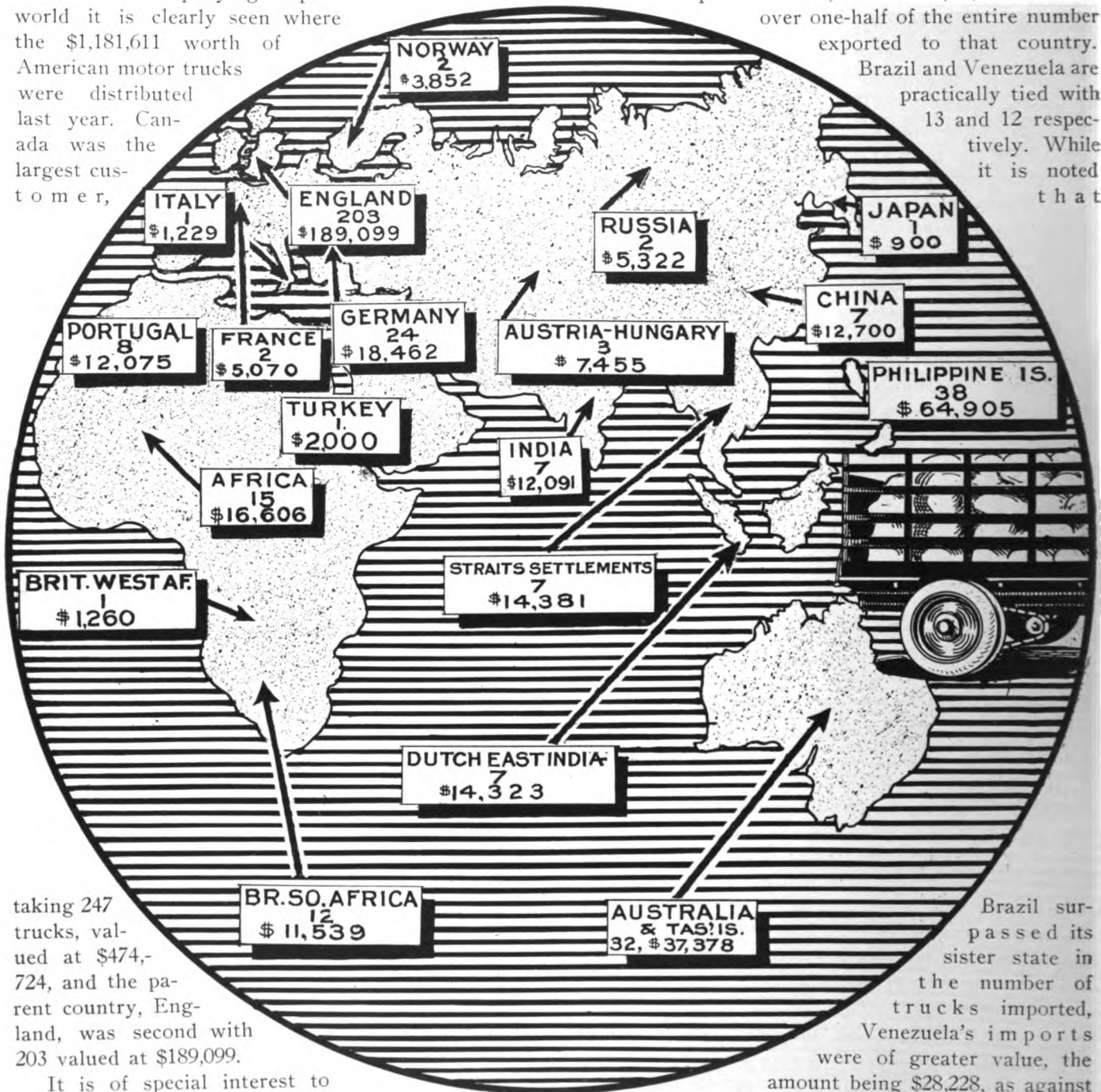
"Neither the President, nor any executive department of the government, possesses the legal authority to interfere in any way with the trade between the people of this country and the territory of a belligerent. There is no act of Congress conferring such authority or prohibiting traffic of this sort with European nations, although in the cases of neighboring American republics, Congress has given the President power to proclaim embargo on arms and ammunition, when, in his judgment, it might prevent civil strife.

"For the government of the United States itself to sell to a belligerent nation would be an unneutral act, but for a private individual to sell to a belligerent any

product of the United States is neither unlawful or unneutral, nor within the power of the executive to prevent or control.

"The foregoing remarks, however, do not apply to the outfitting or furnishing of vessels in American ports or of military expeditions on American soil in aid of a belligerent. These acts are prohibited by the neutrality laws of the United States."

In the accompanying maps of the world it is clearly seen where the \$1,181,611 worth of American motor trucks were distributed last year. Canada was the largest customer,



taking 247 trucks, valued at \$474,724, and the parent country, England, was second with 203 valued at \$189,099.

It is of special interest to note that the belligerent countries now placing orders for thousands of motor trucks from the United States were very poor buyers during the year. France and Russia, for instance, purchased but two trucks apiece, valued at \$5070 and \$5322 respectively. Germany took 24 machines, which had a value of \$18,462. Turkey purchased a single \$2000 truck.

Aside from the warring nations, it is seen that South America was a fair customer, taking 79 trucks valued at \$130,811. During the current year a great boom in this field is expected, and, undoubtedly, the figures for the current fiscal year, ending June 30 next, will show a considerable gain over the past year.

Taking the individual states of South America, Argentine leads in the matter of American truck imports with 48, valued at \$65,225. This is over one-half of the entire number exported to that country.

Brazil and Venezuela are practically tied with 13 and 12 respectively. While it is noted that

\$20,449 for Brazil's 13 cars.

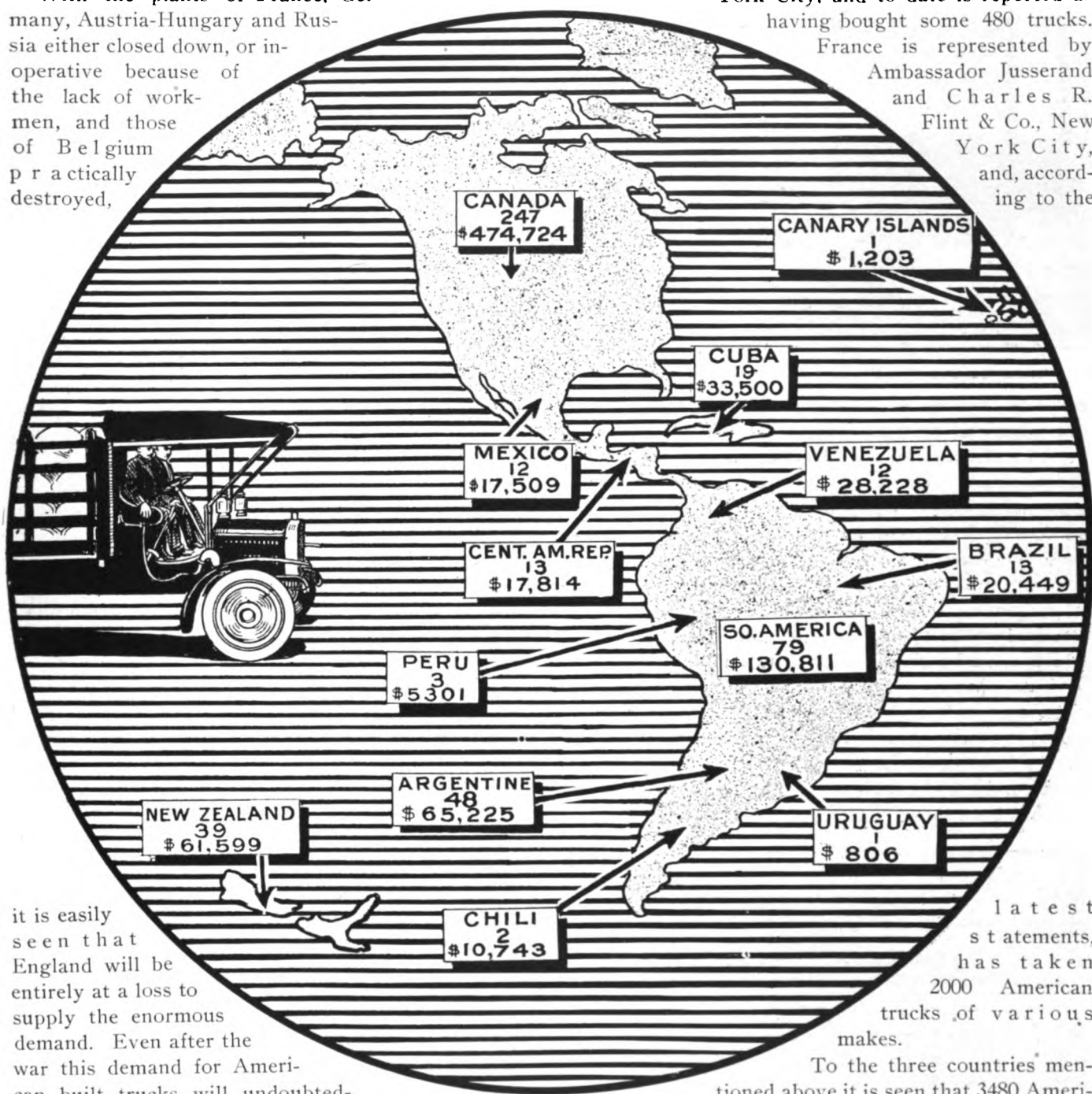
While all of these figures are of vital interest to the American truck manufacturer, yet at the present time his entire energies are being devoted to adjusting matters to meet the conditions caused by the European conflict. The war is swallowing up trucks in a manner that is surprising to the manufacturing interests. The allies, according to the closest and most

conservative estimates, entered the fray with 40,000 to 50,000 trucks. These trucks are reported as being put out of commission at the rate of 500 a day. All of the latest war pictures show trucks strewn along the road sides, and in most instances where the different armies have been forced to surrender they have blown up the trucks and motor equipment rather than let them fall into the hands of the enemy.

With the plants of France, Germany, Austria-Hungary and Russia either closed down, or inoperative because of the lack of workmen, and those of Belgium practically destroyed,

don, England, and Col. Hughes, commander of the Department of Militia and Defense, Ottawa, Canada. Both these representatives are in New York City, and to date have placed orders for 1000 or more trucks for that country. The American address of the English buyers is Chipman, Limited, 8 Bridge street, New York City. Col. Nicoli Golijosrki, representing the Russian government, is at the Vanderbilt hotel, New York City, and to date is reported as having bought some 480 trucks.

France is represented by Ambassador Jusserand and Charles R. Flint & Co., New York City, and, according to the



it is easily seen that England will be entirely at a loss to supply the enormous demand. Even after the war this demand for American built trucks will undoubtedly still exist, as there will be but few cars that will be in any condition for rehabilitation.

At the present time there are a number of special representatives of foreign powers in this country who are purchasing trucks for the various warring nations. Great Britain has two such representatives in H. G. Burford, M.I., M.E., M.I.A.E., managing director of the Automobile Consolidated Alliance, Ltd., Lon-

don, England, and Col. Hughes, commander of the Department of Militia and Defense, Ottawa, Canada. Both these representatives are in New York City, and to date have placed orders for 1000 or more trucks for that country. The American address of the English buyers is Chipman, Limited, 8 Bridge street, New York City. Col. Nicoli Golijosrki, representing the Russian government, is at the Vanderbilt hotel, New York City, and to date is reported as having bought some 480 trucks. France is represented by Ambassador Jusserand and Charles R. Flint & Co., New York City, and, according to the latest statements, has taken 2000 American trucks of various makes. To the three countries mentioned above it is seen that 3480 American made trucks have been sold to date. Greece was a recent purchaser of 50 commercial machines, and undoubtedly numerous large purchases have been made, and will be made daily during the war period which will not become a matter of public record. However, whether such purchases are made known or not will not alter the fact that the American manufacturer is reaping the profits.

NEW 1500-POUND REPUBLIC TRUCK.

ADVANCE information concerning the Republic $\frac{3}{4}$ -ton truck, shortly to be announced, indicates the production of an entirely new vehicle of greater

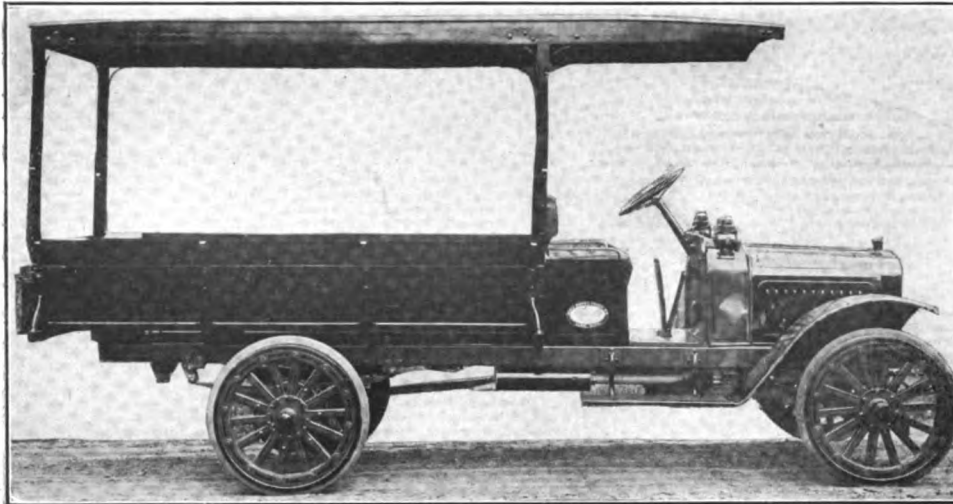
and the development of the various details has followed exhaustive search and long observation.

The power plant is a four-cylinder L head motor, cast en bloc, with $3\frac{1}{2}$ -inch bore by five-inch stroke. A three-bearing crankshaft is used. The oiling system is a constant level, fed by plunger pump, and the cooling is by thermo-syphon with a vertical flat tube radiator.

The transmission is the selective sliding gear type, with three speeds forward and one reverse, operated by a centre control lever mounted in a ball and socket joint. The gears are of heat treated nickel alloy steel, with a $\frac{7}{8}$ -inch face. A 12-plate disc clutch is used.

The drive is carried by a two-inch tubular shaft through Hartford joints to the rear axle, which is of the internal gear type, constructed of nickel steel. In the determination of the drive adopted, much care has been exercised, and the internal gear has been selected after experiment with many types under a great variety of conditions. The rear axle has been designed to provide strength equal to the chain drive and to withstand both the shock and the driving strain under the most trying conditions and with the greatest possible overload.

The front axles are drop forged, carrying roller bearings, and the wheels, both front and rear, are of the artillery type, built up with $14\frac{1}{4}$ -inch spokes. A worm and split nut steering gear, with an 18-inch hand wheel, is located on the left, with the control levers in the centre. Two sets of brakes are provided, one in-

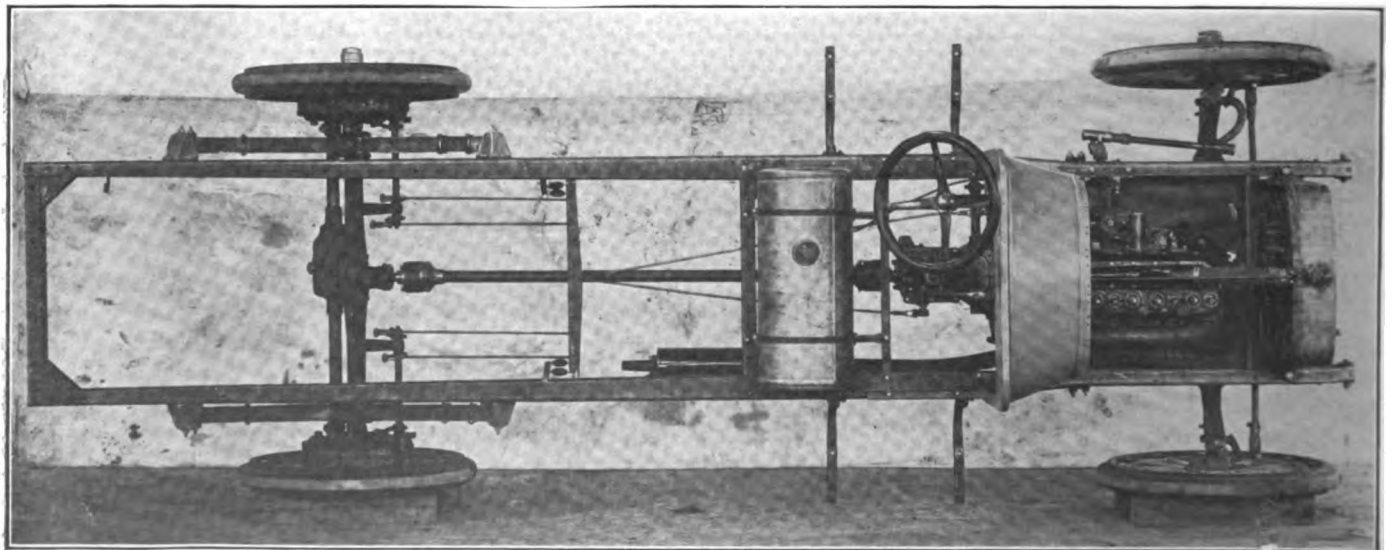


Three-Quarter Ton Republic Truck Equipped with an Attractive Type of Body.

capacity than the model C, but still adapted to the requirements of light and rapid hauling.

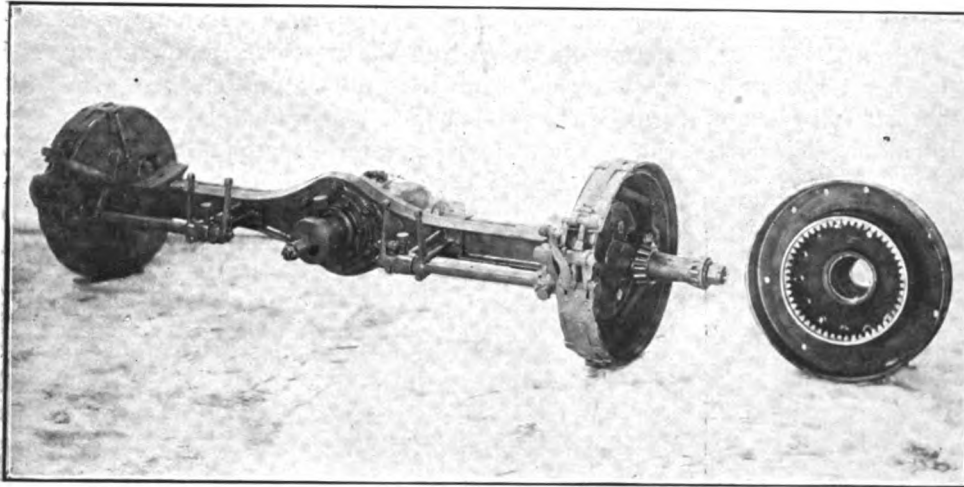
A careful investigation has been made by the Alma Manufacturing Company, by which the Republic is manufactured, extending over a period of 18 months and covering all conditions of haulage over the whole country. An effort has been made to determine upon and design a commercial car of universal utility, within reasonable limits, and to work out a mechanical construction best adapted to the conditions to be met, which could be produced at a reasonable price.

The capacity of 1500 pounds, with a margin for overload, has been found to best answer the requirements of users, and flexibility and speed have been shown to be important considerations. The employment of the highest class of materials and construction has been recognized from the first as a necessity,



Top View of Republic Chassis Stripped to Show Details of Construction.

ternal expanding and the other external contracting. Both sets act on the rear wheels and are provided with an efficient equalizing arrangement.



The Rear Axle and Internal Drive of the Republic Truck.

The chassis is built up with a pressed steel frame of channel section, $4\frac{1}{2}$ inches deep, the side members being of $\frac{3}{16}$ -inch stock. The springs are semi-elliptic, self-lubricating, heat treated and oil tempered, 38 inches long in front and 48 inches in the rear. The wheelbase is 124 inches and the tread 56 inches. The tires are 35 by three-inch front and 35 by $3\frac{1}{2}$ -inch rear, Firestone solid being standard equipment. An option is given of 35 by five-inch pneumatics at an extra charge.

The equipment consists of oil side and rear lamps, horn, tool box and tool kit, although this is subject to a slight change. The gasoline tank is of 12 gallons capacity.

FIRESTONE MEN IN CONVENTION.

The Firestone Tire & Rubber Company, Akron, O., recently held a sales convention at its plant, when more than 250 representatives were present from all over the country. The number in attendance necessitated the use of one of the partially finished additions to the Firestone factory for the gathering. The conference was notable for the business transacted, as well as for the pleasure arising from the social end of it. The representatives were enthusiastic, but seriously determined to get the most out of the event. The business sessions were given over to the discussion of sales promotions and a thorough study of the products. There were many instructive addresses on the part of officers high in the various departments of the Firestone organ-

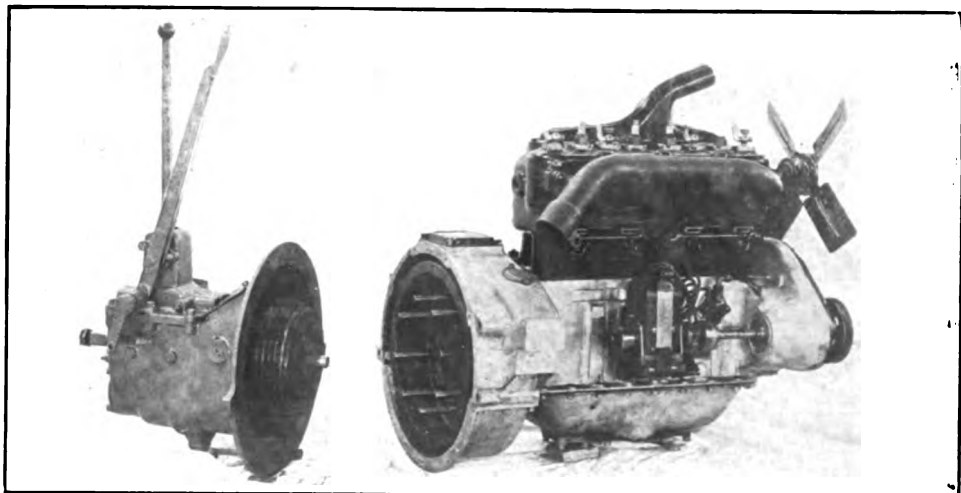
ization. The representatives were taken through the big plant under the guidance of a number of instructors, offering the men ample opportunity to study the products they sell. A feature was the manner in which the news of the convention was handled. The company issued a special newspaper, called Co-Op, symbolizing the Firestone spirit of co-operation. Another feature was the taking of motion pictures of the gathering. The convention closed with a banquet.

The Firestone Company at its recent meeting announced a 78 per cent. increase in output over the previous fiscal year. All departments have been crowded to more than capacity in order to take care of this additional business. The new additions, which will add 96,800 square feet to the floor space, are nearing completion.

DIESEL MOTORS FOR SUBMARINES.

Diesel motors of various designs are being used in all submarines at the present time, both in the American and foreign service. Every nation has adopted the internal combustion motor to supply submarines with motive power, most of them using crude fuel or residue oils instead of gasoline.

All Diesel motors are based on the original patents of Dr. Diesel, a German scientist, and there are several concerns in this country engaged in the manufacture or sale of motors of this type. They are the New London Ship & Engine Company, the Gas Engine & Power & Seabury Company, the Fulton Company, James Craig and T. Orchard Lisle, the latter company representing the Wexspoor-Diesel, which is manufactured by a Stockholm, Sweden, firm.

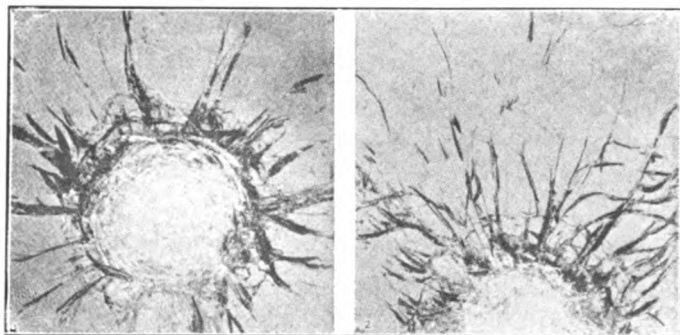


The Republic Power Plant, Showing Clutch Assembly.

SUBSTITUTE FOR ARMOR.

Successful Tests of Bi-Triplex Glass for Protecting War Trucks.

The extended use of motor trucks in the European war has caused a big problem in the matter of armor plate. Where a driver is exposed to rifle fire his serv-



Results of Tests Nos. 1 and 2, Showing Effect of Rifle Fire on Bi-Triplex Glass, Which May Replace Steel as Armor Plate.

ices, and the operation of the machine, are rendered impossible, of course, if he is killed or injured. While it is easy to protect the driver on all sides by bullet proof steel armor, yet this is not satisfactory, as it practically eliminates all vision, except for narrow peep hole strips.

With this problem in mind, the Triplex Safety Glass Company, Ltd., London, England, recently conducted a series of experiments with bi-triplex glass. In these trials an army service rifle and ammunition were used, and shots were fired at test pieces of this material at a range of 300 yards. In the accompanying illustrations the results of the tests are clearly shown.

In test No. 1, bi-triplex, $1\frac{1}{4}$ inches thick, the bullet struck it almost in the centre, but only penetrated the first thin layer of glass $1/10$ -inch thick. The intermediate and back sheets were cracked, but the last sheet remained perfectly smooth.

Test No. 2, bi-triplex, $1\frac{3}{8}$ inches thick, the bullet struck the lower left hand corner, penetrating one layer of glass and one xylonite, but without going any further. The back sheet of glass was slightly bulged. The third test, bi-triplex, $1\frac{1}{4}$ inches thick, damaged the glass badly, but the bullet did not go through. In the fourth test an ordinary piece of triplex glass, $\frac{1}{4}$ -inch thick, was shot at from a distance of 50 yards. Six bullets were fired through this piece of glass, making the same number of clean holes, but did not affect the strength of the glass.

Triplex glass is built up of layers of glass and sheets of xylonite, giving practically the same transparency as ordinary plate glass of the same thickness.

AUTO MAIL TRUCKS FOR INDIA.

Henry S. Baker, United States consul at Bombay, India, writes that among improvements contemplated

by the postoffice department in Bombay, is the employment of motor lorries instead of horse drawn vehicles for carrying mails. It is proposed to introduce about 12 motor lorries and to do away with the existing vehicles. The motors will deal with mails between the docks and the postoffice, the carriage of mails to and from the railway stations, and generally replace the present means of transit, so that the mails can be handled with greater dispatch. Bombay will be the first city in India proper to be provided with motor lorries for the postal service, but they have been introduced in Rangoon, where they have proved a great convenience.

BRITISH FACTORIES BUSY.

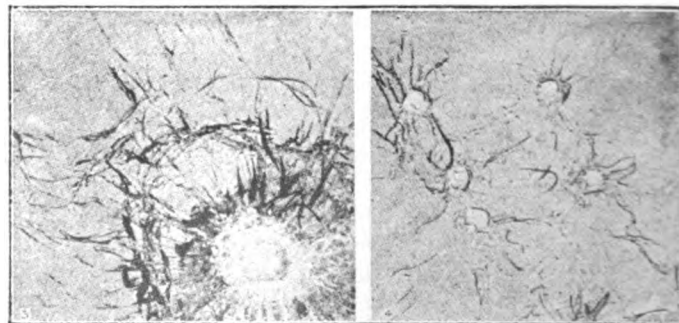
Taken as a whole, the automobile industry in England has been rushed as the result of the war. Practically every branch of the manufacturing end of the trade is working day and night in order to keep abreast of the rush orders due to the conflict. Nearly every British truck, automobile, tire or accessory manufacturer is handling the government's work and finds it difficult to fill these orders without taking on any additional work.

The rule adopted by manufacturers throughout England in regard to the labor problem is an extremely fair one. Notices have been posted in all factories to the effect that the positions of the men who enlist will be kept open for them and work will be guaranteed them on their return from the war. In the meantime the companies are providing for the dependents.

WAR CREATES BIG DEMAND FOR RUBBER.

London dispatches state that the price of rubber will be maintained at over 24 cents a pound for the next six months. The requirements of the allied armies are sufficient to absorb practically all of the plantation marketed rubber during that period.

The Federal Motor Truck Company, Detroit, Mich., will install a profit sharing plan Jan. 1. Every



Test No. 3 is a Piece of Bi-Triplex Glass, $1\frac{1}{4}$ Inches Thick and, as in the Other Tests, the Bullets Did Not Penetrate.

employee who is at work on Dec. 31 will receive a share of the profits of the concern. This share will be equal to 10 per cent. of the worker's yearly salary.

EFFECTS SAVING IN ROAD CONSTRUCTION.

Jeffery Quad, in Service with Road Contractor and Hauling Two Trailers, Reduces Transportation Cost \$35.43 a Day.

A THOROUGH test of the value of trucks and trailers in road construction work was recently given by a Wisconsin contractor, and it was clearly demonstrated that a large saving could be made compared with

a yard carried by the Quad and its trailers was 27 cents for the hauling, plus seven cents a yard for the additional labor required in loading, giving a total of 34 cents a yard as compared with \$1 by team. This is a saving of 66 cents a cubic yard, or \$1320 a linear mile, which is estimated to contain 2000 cubic yards.



It Was Necessary to Traverse Two-Fifths of a Mile of Loose, Sandy Dirt Road.

the old time horse drawn vehicle methods. The truck used was a Jeffery Quad, made by the Thomas B. Jeffery Company, Kenosha, Wis., fitted with a hand operated dump body. This truck pulled two trailers on a concrete road building operation near Kenosha and, on a round trip of 5.4 miles, it was shown that a saving of \$35.43 a day could be effected.

At this rate of saving the truck and its trailers would pay for themselves in 123 working days; or, as the Jeffery Company says in its bulletin, Series A No. 1, copyrighted 1914, the Quad hauling outfit would show a clear profit of \$10,644 in a year of 300 working days of 10 hours each, after a generous allowance for every possible item of expense. This is a net return of over 44 per cent. a year on the original investment.

The test was held for the benefit of George Wade, a road contractor, who has been considering the purchase of a Quad truck and, before the test, said he would be satisfied if it could do the work of three teams. As the demonstration shows, the Quad and one driver, with two extra shovellers, did as much work as nine teams, which would require 18 horses and mules and nine drivers. For the road in question, about 2000 cubic yards of material to the mile had to be hauled. The cost

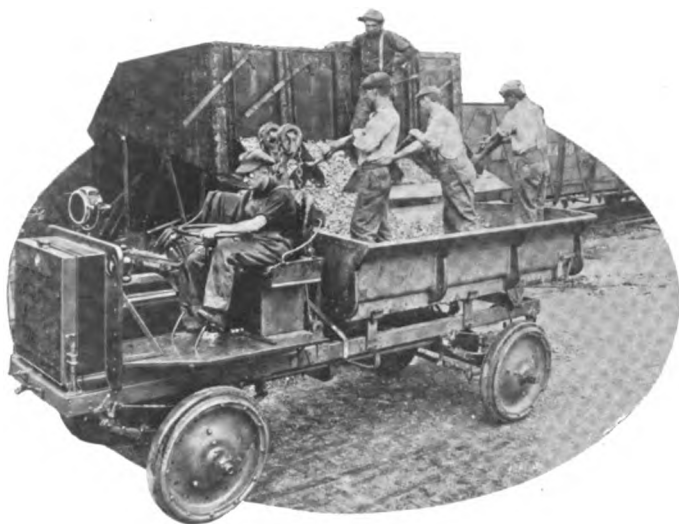
trouble. The average speed over the rest of the road was only 5.72 miles an hour; but this included two-fifths of a mile of loose, sandy dirt road, on which, in places, the speed of the Quad with its trailers had to be reduced to about two miles an hour, on account of the rough going.

The material was hauled from a railroad team track near the centre of the city of Kenosha to the head of the concrete road on Park avenue, which is being extended about three miles from the city. On this job Contractor Wade has been using teams, some of which he owns, and some he hires at \$6 a day. Usually he employs nine or 10 extra teams a day, at a cost of \$54 or \$60 respectively for their hire.

For the \$6 a day, Mr. Wade gets a pair of good horses or mules, a 1½-yard Bain patent dump wagon



Jeffery Quad with Two-Ton Load and Trailing Five Tons.



Showing the Method of Taking on a Load from Hopper.

and a husky driver, who helps in the loading at the team track. This outfit can make four trips a day at the point of the road where the Quad made its test. Thus a wagon hauls six cubic yards of gravel a day. So the cost of hauling the gravel by team is \$1 a yard, not counting the extra men who are kept at the team track to help in loading the wagons.

The first trip was made by the Quad and one trailer. Being new to the job, it took six minutes to load the truck, $3\frac{1}{2}$ minutes to couple up the trailer, 24 minutes to make the haul out, $16\frac{1}{2}$ minutes to dump the truck and trailer and couple up for the return trip, and $13\frac{1}{2}$ minutes to make the run home. About $3\frac{1}{2}$ yards were hauled on this initial trip, and the round trip time was $63\frac{1}{2}$ minutes, a comparatively poor performance in view of what was done later, although even then it was a big improvement over the horse teams.

On the second trip, with the experience of the other to go by, the time to load the truck itself was reduced to two minutes and 15 seconds, although there were still several avoidable delays included. However, after a complete working out of the test, it was plainly seen that it was advisable:

1. To use four trailers, leaving two at the team track to be loaded while the others were being trailed behind the Quad.

2. To hire enough extra shovellers at the team track to keep the hopper and the two extra trailers always full when the Quad arrived with its two empty trailers at the end of each trip. The two loaded trailers were coupled together and ready to be fastened by a clevis to the spring supported ring on the rear frame member of the Quad, without loss of time.

3. To use one of the teams on the job to reverse the trailer wagons after dumping their loads at the end of the run,

while the Quad was making its turn in the deep sand off the end of the concrete road. The road was only 14 feet wide at this point.

4. To let the Quad driver do nothing but to drive his truck, and leave to the other men such operations as coupling, uncoupling and dumping both the trailers and truck.

At this rate the Quad and its trailers could make exactly 12 complete round trips in a 10-hour day on this particular job. The test further showed that rather more than five miles were averaged to a gallon of gasoline, including both the outgoing and incoming journeys. The oil figures were carefully tabulated and appear in table I. The tire cost is an estimate made after careful and long-continued tractor and trailer tests on the same roads. This figure, the company says, may be too low for the average road in the same class of work, but it is accurate in this particular case.

TABLE I—TRUCK STATEMENT.

Fixed Costs, Per Day.	
Interest on investment of \$3350 (\$2750 cost of chassis, plus \$600, cost of dump body) at six per cent., is \$201 a year, which, reckoning 300 working days to the year, is, per day	\$1.67
Garage rent, dead storage, \$10 a month, which, reckoning 25 working days to the month, is, per day	.40
Painting and annual overhaul (excluding running repairs) \$150, which, reckoning 300 working days to the year, is, per day	.50
Insurance and taxes, per year, \$180, or per day	.60
Driver's wages, per day	3.00
Total fixed costs, per day	\$5.17
Variable Costs, Per Mile.	
Tires, per mile	1.78
Depreciation of chassis (less tires), assuming life of $7\frac{1}{2}$ years at 65 miles per day, is, per mile	1.67
Depreciation on dump body, value \$600, life five years, is, per mile	0.60
Gasoline, average five miles to the gallon (truck loaded and unloaded), at 15 cents per gallon (to allow for possible tax increases), is, per mile	3.00
Oils, waste and grease, per mile	0.40
Repairs to truck, per mile	3.00
Repairs to dump body, per mile	0.40
Total variable cost, per mile	10.85

In the same table appears the item of depreciation, which must be considered in connection with the annual overhaul

charge and the repair item.

A life of about $7\frac{1}{2}$ years is assumed for the truck



Method of Dumping the Load on the Concrete Road at the End of the Run.

and, if the machine made 12 trips a day on such a job as the one under consideration, it would run about 65 miles a day, or approximately 20,000 miles a year. At

day the total costs can be ascertained by adding the extra mileage cost at 13.15 cents a mile, plus the cost for the services of an extra driver.

TABLE II.

Hauling Costs with Quad Two-Ton Truck and Four Trailers, Two Working and Two at Team Track.

No. trips per day	Miles per day	Fixed cost per day	Running costs at 13.15 cents per mile	Total cost per day
5	27.0	\$6.05	\$3.55	\$9.60
6	32.4	6.05	4.26	10.31
7	37.8	6.05	4.97	11.02
8	43.2	6.05	5.68	11.73
9	48.6	6.05	6.39	12.44
10	54.0	6.05	7.10	13.15
11	59.4	6.05	7.81	13.86
12	64.8	6.05	8.25	14.57

this rate the three cents a mile allowed for repairs amounts to \$600 a year, which, added to the \$150 a year for the annual overhaul, makes a total of \$750 a year to keep the truck in first-class condition. In 7½ years the truck would travel 150,000 miles, and in this time the sum allowed for upkeep amounts to \$5550, or more than double the original investment in the chassis, even with the tires included. The trailer charges, so often omitted in calculations of this kind, are taken care of, and it should be stated that even the depreciation and repairs on the body are figured separately.

The Quad and trailer in the case under consideration, with an outfit of one Quad and four Bain patent dump trailers, two working and two being loaded at the track, could be operated on this particular job for \$6.05 fixed costs a day. This is incurred whether the mileage is small or great, plus 13.15 cents a mile for

TABLE III.

Costs Per Yard and Yard-Mile of Hauling Gravel by Quad Truck and Trailers, as Against \$1 a Yard by Horses.

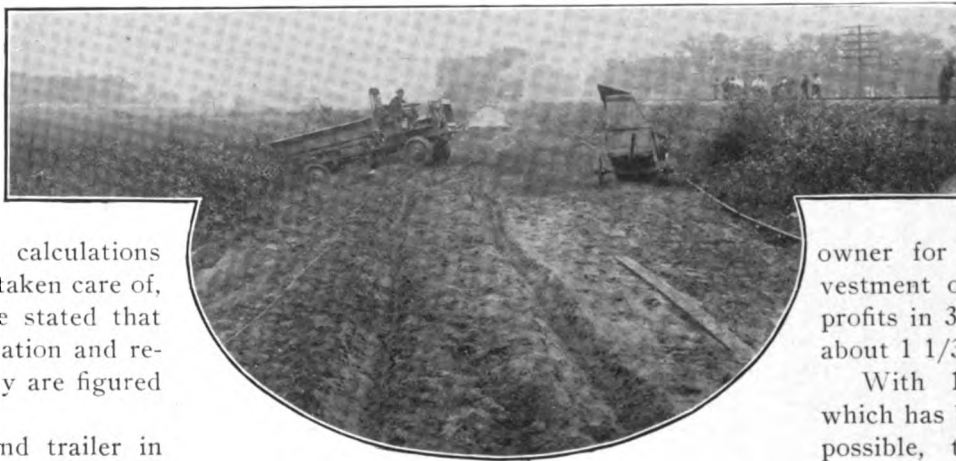
No. trips per day	Total cost per day	No. yards hauled per day	Cost per yard hauled	Cost per yard-mile
5	\$9.60	22.5	\$0.42	\$0.15
6	10.31	27.0	0.38	0.14
7	11.02	31.5	0.35	0.13
8	11.73	36.0	0.32	0.12
9	12.44	40.5	0.30	0.11
10	13.15	45.0	0.29	0.11
11	13.86	49.5	0.28	0.10
12	14.57	54.0	0.27	0.10

Table III shows these costs worked into cost a yard hauled and the cost a yard-mile, not counting the cost of extra shovellers that may be needed at the team track. This extra cost, however, is taken care of in table IV, which is the most complete of all. This table shows that, with only five trips a day, the Quad outfit

with one extra shoveller is equivalent to 3¾ teams, saves \$10.90 a day over team costs, and recoups its owner for the original investment out of the actual profits in 398 working days, about 1 1/3 years.

With 12 trips a day, which has been shown to be possible, the Quad, with its hand dumping body and four trailers costing \$4350

altogether, saves \$35.43 a day and pays for itself out of the actual profits in 123 working days, .41 of a year. This should be good news for road commissioners, road contractors and good roads enthusiasts all over the country. It is an



The Quad Making the Turn in the Loose Sand Off the End of the Road.

TABLE IV.
Gross and Net Savings of Quad Truck and Trailers in Road Building Operations Near Kenosha, Wis.

No. trips per day	No. teams for same work...	Cost of operating quad and trailers	Cost of hiring teams	Gross savings of quad per day over teams	Horse driver hours in loading.	Cost of extra loaders for truck and trailers.....	Net saving of quad per day over teams	No. working days to retire investment out of profits
5	3¾	\$9.60	\$22.50	\$12.90	7½	\$2.00	\$10.90	398
6	4½	10.31	26.00	15.69	9	2.00	13.69	317
7	5½	11.02	31.50	20.48	10½	2.00	18.48	235
8	6	11.73	36.00	24.27	12	4.00	20.27	215
9	6¾	12.44	40.50	28.06	13½	4.00	24.06	181
10	7½	13.15	45.00	31.85	15	4.00	27.85	156
11	8½	13.86	49.50	35.64	16½	4.00	31.64	138
12	9	14.75	54.00	39.43	18	4.00	35.43	123

every mile operated. Table II gives the daily operating costs for this hauling outfit for five to 12 trips a day. If the Quad is operated more than 10 hours a

open secret that many bids are being turned down because the lowest bids are above the state engineers' estimates.

SERVICE IN THE COMMERCIAL VEHICLE FIELD.

The Importance of This Factor and How Efficiently It Is Handled by the Manufacturer, Is Exemplified in the Service System of the Autocar Company, Ardmore, Penn.

A MOST important factor in the commercial vehicle field is the service provided by the manufacturer for the benefit of the users of his cars, and the very complete organizations that have been developed for this purpose.

Efficiency in such service is demonstrated by the service system of the Autocar, the familiar truck produced by the Autocar Company of Ardmore, Penn., and cared for by 38 service stations so located as to cover the whole United States. These stations are supplemented by agencies in other cities, which are provided with facilities for the care of cars remote from the service centre.

Each station occupies its own building, with ga-

from floor to floor, those requiring merely inspection remaining on the first floor, while repairs and adjustments are made on the second floor, on which are located the stock room and all machine equipment. A complete stock of all parts is carried constantly and the machine shop is provided with tools and machinery of unusual variety and adapted for rapid and accurate work.

Two shifts are run, the station being open 24 hours a day and every day in the year, the night shift consisting of six men beside the foreman, as most of the repair work is done at night in an effort to keep every car ready for service every day. Should this be impossible, extra cars are kept on hand to take the place of any out of commission, thus avoiding interruption in the owner's work, even in case of serious accidents. To the same end drivers are provided to temporarily take the place of any regular operators who are unable to take their cars out.

The charge for service is \$25 a month, and includes polishing, washing, oiling and inspection. Repairs are made at a charge of 60 cents an hour for labor, and factory prices for all parts supplied. Every effort is made to have the car ready before morning but no repair job goes out until the car has been thoroughly tested, the driver knowing when he goes on the run that it is in shape for work. Service outside of the city is handled by a travelling inspector making



Service Station Maintained at Providence, R. I., by the Autocar Company, Ardmore, Penn.

rage machinery and a full line of parts, and that here described may be taken as typical of the equipment and facilities provided. This station is located at 302 Pearl street, Providence, R. I., and cares for all Autocars in Rhode Island, as well as in some territory adjoining in Connecticut and Massachusetts, in which district there are at present 118 cars. While primarily operated for the care of cars made by the Autocar Company, other trucks are given attention, but pleasure car work is not sought, and is subordinated to the commercial work in every case.

The building occupied is of brick, 90 by 28 feet, and two floors are used, giving facilities for upward of 40 cars on each floor. A large elevator carries the cars

monthly rounds, no charge being made to Autocar owners except for labor or supplies.

The system employed is worthy of attention, as it not only assures the performance of the proper work at the proper price, but also informs the owner of all important facts relating to the operation of his car and the service which it is giving him. When the truck comes in at night, any repairs which the driver knows to be needed, are noted by him on a repair slip, which is turned into the office. The car is then carefully inspected, and any other repairs or adjustments which are found to be necessary are entered on a similar repair slip, which goes to the office, and is used, together with driver's memorandum, to make up repair order.

This order, illustrated herewith, is the basis of the working system, and is made in triplicate, one copy going to the stock room as an authority or requisition

and minimum and perpetual inventory features. The stock record is kept in card form, the cards being five by eight inches in size, both sides of which are

used, one card being devoted to each separate item carried in stock, however small. The maximum and minimum are entered, the name and symbol of piece, and the section and bin number where it is kept. All parts sent out of stock are entered from the repair order, and deducted from the balance on hand, and new supplies are ordered when this balance approaches the minimum. Incoming supplies are, of course, added as they arrive, a memorandum being made of material ordered and the balance to come in case of partial deliveries.

Material Used on Repair Order							
DATE	No. of Units	PARTS NO.	DESCRIPTION	Unit Price	CUSTOMER'S CHARGE	T & O C.	REMARKS
10/10/14	2		Spark plugs	.75	1.50		

Material Used in a Repair Job Is Entered on This Form, Which Is Printed on the Back of Repair Order.

tion for stock, a second copy going with the job, as a shop order, and the third remaining on file in the office. The owner's name and address, and his private car number, together with the date received, are entered in blanks provided, and the car is further identified by the entry of the name, and the type and serial numbers. A concise, but complete notation of the work required is made in the body of the form under the heading, "Work Ordered Done", and the shop and stock room copies are sent to their respective departments. On the bottom of the sheet space is provided for the record of the time consumed in labor, and on the back is entered the material used, so that the one sheet carries in detail all the information relating to the job. The space provided for the description of the work ordered is extended to the right and divided into columns under the head "Charge". Here the totals of labor, materials and similar items, grouped and priced, are entered under their respective heads, and the total charge brought down, thus summarizing the whole job for convenience in billing and accounting.

The monthly invoice carries all the repair charges in separate items, which may be checked from the repair orders and from the original repair slips, duplicates of which are sent to the customer. Gasoline and oil, which are supplies, do not appear on the repair order, but are included in the invoice.

While the stock system employed is of only indirect interest to the car owner, the promptness of the service depends to a great extent on its efficiency, since the absence of some special part, even the smallest, may delay the completion of a job for several days, with consequent inconvenience and expense. In the stock room of the Autocar service stations a simple, but effective, system is used, embodying the maxi-

imum and minimum and perpetual inventory features. The stock record is kept in card form, the cards being five by eight inches in size, both sides of which are

used, one card being devoted to each separate item carried in stock, however small. The maximum and minimum are entered, the name and symbol of piece, and the section and bin number where it is kept. All parts sent out of stock are entered from the repair order, and deducted from the balance on hand, and new supplies are ordered when this balance approaches the minimum. Incoming supplies are, of course, added as they arrive, a memorandum being made of material ordered and the balance to come in case of partial deliveries.

The form used for ordering goods from the factory is in four parts and contains complete information relating to the transaction between the factory and the service station. Not only are included the usual detailed specifications of the supplies ordered, together with shipping and billing instructions, but also full information as to the state of stock, the maximum and minimum, etc. One copy is retained in the office, and three are sent to the factory, one of which is returned with the invoice.

PROVIDENCE—Form A. 11		AUTOCAR SALES & SERVICE CO. PROVIDENCE		No. 3000	
ORIGINAL		REPAIR ORDER		Garage Contract Motor	
Autocar Pleasure		Charge to OWNER		Outside " "	
" Commercial		Owner THE OUTLET CO. #8		Date Finish	
All Towing Cars		Address WEYBOSSET ST. PROVIDENCE, R. I.		O. K'd By	
Autocar Co. Cars		Car received OCT. 10, 1914. Via		Invoice No.	
PARTICULARS OF CAR		Promised Work ordered by		Made out by	
Type XXI-C	Our No. 10398				
Eng. No. 10398	Cust. No.				
WORK ORDERED DONE					
Please record this on sheet to be used in billing					
Grind valves and clean cylinders--adjust foot brakes					
Repack pump.--clean spark plugs					
CHARGE					
Labor 1 1/2 hours @ \$6.00		Material, four over		Expenses, per mile	
Total Charge		2		40	
TIME RECORD					
Name					
Date					
REMARKS:—					

The Repair Order Used in the Autocar Service System, Showing All Details of the Job.

after being signed by the manager. The matter of adjustments is also handled through the service station, suitable forms being provided, and every care is exer-

cised to give the customer absolutely fair treatment, while guarding against imposition by unscrupulous owners, which is, fortunately, uncommon.



J. E. Higgins, General Manager of Providence Autocar Service Station.

While it will be seen that the system in use is excellent, its efficiency depends to a very great extent on the men in whose charge the service is placed, as well as on the policy of the manufacturer by which it is operated. In both particulars, and in the resulting service, the Autocar Company is deserving of much credit. The very able force

at the Providence station, headed by General Manager J. E. Higgins, formerly of Boston, Mass., may be taken as an example of the care that is exercised in the selection of the men on whom the service really depends. Mr. Higgins has been in charge of this station ever since the rapid increase of the use of Autocar trucks in Providence and the adjoining territory necessitated the separation of the service from the sales branch. He has surrounded himself with reliable and efficient assistants and employees, and has established and maintained a service which is highly satisfactory to the owners in his district.

Behind the station is the factory, without whose co-operation and support good service is impossible, however excellent the equipment of the service branch. Service means much, or nothing, and the Autocar Company has been careful and persistent in giving very real attention to this branch of its business. Not only are inspection, repair and similar details carried out, as has been briefly described, but in other ways less prominent, but perhaps of equal importance, the owner is helped to get the utmost value out of his car, and to suffer as little as possible from avoidable troubles.

To this end a free school for drivers is maintained and every employee of the owner who is to be placed in charge of a truck is thoroughly taught its operation and care without charge. And this is not all, for a careful observation is made of the handling of his

car, not only when it is first taken out, but during all of the time the driver has it in charge. Careless operation is reflected in reduced service and increased expense, and the manufacturer, while primarily serving the owner in this supervision, is contributing to the value and reputation of his product as well. The attention paid by the maker to the performance of his product, after it has finally left his factory, is perhaps greater in the commercial vehicle field than in any other line of production, the necessity and advisability being universally recognized. It is a broad application of the responsibility of the manufacturer, but here, as elsewhere, is productive of a definite return through enthusiastic and influential users, the best business producers possible.

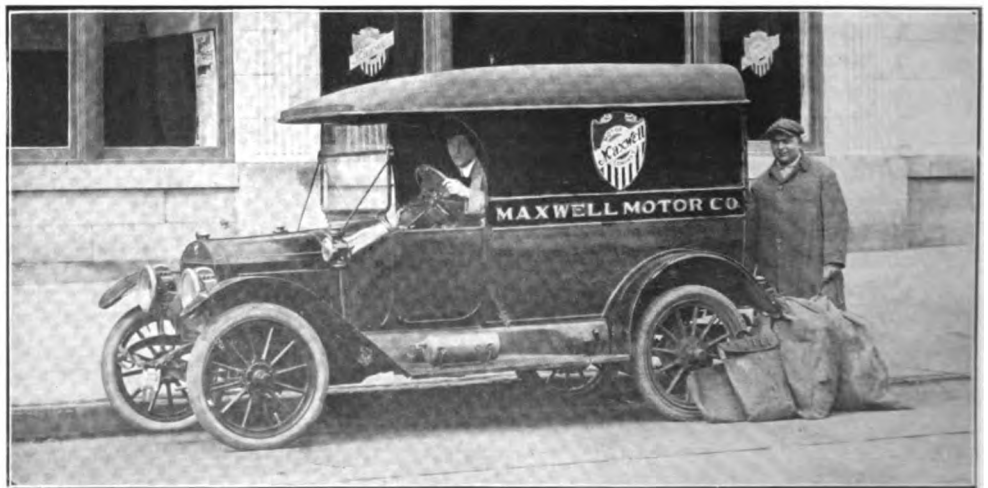
MAXWELL CARRIES MAIL.

The mail car employed by the Maxwell Motor Company, Inc., Detroit, Mich., is an interesting means of dealing with the problem of light haulage, presented in the handling of the mail of a large concern.

The car in question, which is illustrated herewith, has been in use for two years and is still giving satisfactory service. Five daily trips are made between the main office and the postoffice, and four trips between the office and the three separate factories, making an average daily run of 30 miles for every working day in the year, a total of nearly 18,000 miles since the car was put in service.

The volume of mail is sufficient to load the car well up to its capacity, consisting of 15,000 first-class letters and 4000 parcel post packages a week and five bags or more of second-class matter each day, for the incoming mail alone. The outgoing mail is somewhat smaller in the number of first-class letters, but the second-class matter runs from four to eight bags a day.

The car was built on a stock 25 chassis, with a body specially constructed for the purpose, and its perform-



The Maxwell Mail Car Which Has Run 18,000 Miles and Is Still Giving Satisfactory Service.

ance demonstrates the practicability of adapting a light car to those commercial purposes for which the usual truck is not suited.

ELECTRIC VEHICLE PRACTISE.

Necessity of Selecting the Type and Size of Rectifier That Will Serve a Specific Purpose— The Limitations of the Machines with Reference to Range of Operation— Some of the Probable Results from Overloading.

By William W. Scott.

WHEN a mercury arc rectifier is constructed, it is to a design that will accomplish a specific purpose and there will necessarily be limitations that cannot be exceeded without deterioration and eventual destruction, and for that reason the necessity of determining the exact type of machine or instrument is evident. Considering them broadly, they have capacities ranging from five to 50 amperes, and from 15 to 350 volts direct current, and they can be operated on either 110 or 220 volts single-phase, or on one leg of a three-phase circuit. They are also built for all commercial frequencies from 25 to 135 cycles. From this statement one will note that there must be accurate knowledge of the source of current supply, and the particular type that will best serve must be selected. This selection, however, can only be done by one experienced in electric engineering, and obviously where there is a given current supply there will be limitation to the service that can be afforded.

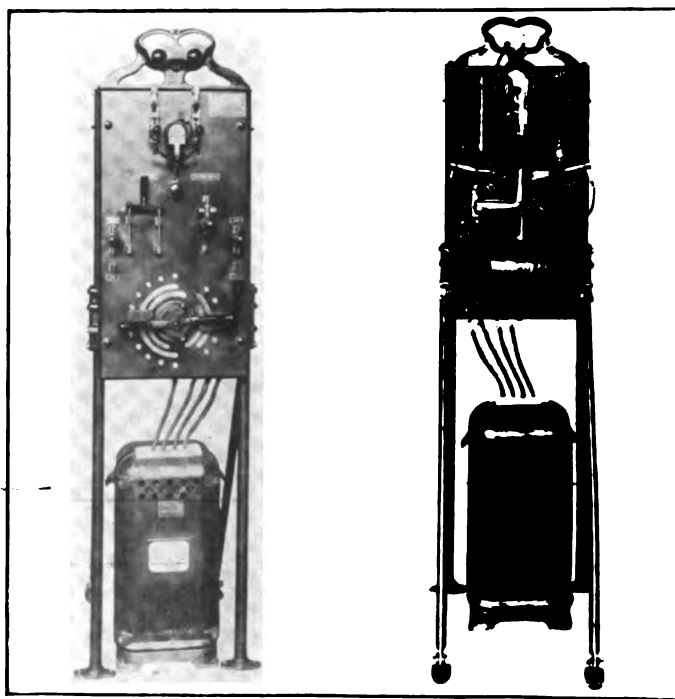
Too strong emphasis cannot be placed on the statement that there is need of installing the machine that is best suited for the work to be done. There are numerous factors for consideration, among them being continuity of service of the apparatus in the event of increase of the number of vehicles, obtaining the desired efficiency with the minimum consumption of current, and making the least investment that is compatible with the standard of equipment that is necessary to endure.

Considering these factors in sequence, the service must be planned with regard to the future in that the unit itself ought to be of a size and type so that with increased demands it will be possible to use the rectifier in multiple with others, for uniformity of equipment is always desirable and makes possible interchangeability that is decidedly economical of expense of maintenance and minimizes time losses. Not only this, but standardization simplifies attention and labor and one series of tubes will provide for every exigency. Again, there is absolute certainty of precise results, obviating the necessity of making allowance or correction.

For instance, with a well chosen type and size of rectifier additions can be made from time to time, increasing the investment only as needed, and insuring that the character of the service will be unchanged. After the initial investment the only expense that may be logically anticipated is that of tube renewal, and

this will depend in considerable part upon the operation being as near normal as is practicable. As a matter of fact a series of rectifiers ought to endure for years and maintain a very satisfactory standard of efficiency. There ought to be no deterioration in service productiveness.

The efficiency of the mercury arc rectifier is not variable because of the class or character of work required. The type and size desirable for an installation ought to be selected as near to the maximum capacity as is practical, as efficiency will vary with the



Front and Rear Views of Standard Type General Electric Rectifier Adapted for Current from 60 to 140 Cycles.

direct current voltage output, for there is a definite voltage drop in the mercury arc in the tube irrespective of current or voltage. This voltage fall across the tube may be closely approximated, and 15 volts will be a reasonable allowance with any load. This loss, as has been stated, is represented by heat and light. For this reason the efficiency is lower on low voltages and higher on high voltages, the ratio being the line voltage less the voltage drop in the tube. The efficiency with reference to the load is practically unchanged from one-third of the current output up to the maximum, though slightly greater at the low current output than at the higher. This may be illustrated by

the statement that at 60 volts direct current the efficiency will be about 70 per cent., at 70 volts about 75 per cent., at 100 volts about 78 per cent., and at 175 volts or higher (up to 350 volts), from 80 to 82 per cent. Taking 100 as the standard and allowing 15 for the voltage drop in the tube, the current loss can be determined very closely. This, however, is characteristic of all forms of mercury arc rectifiers, and cannot be varied by size or type of machine.

The price of the current is a factor of decided importance. The usual policy of public service companies is to make a charge for consumption to a definite number of kilowatts, and as the amount of current used increases the rate decreases. This is intended to encourage the use of current, but battery charging does not demand a given amount daily. Neither is there reason to use more current than is absolutely necessary, for when a full charge is given a definite time must be allowed, from seven to eight

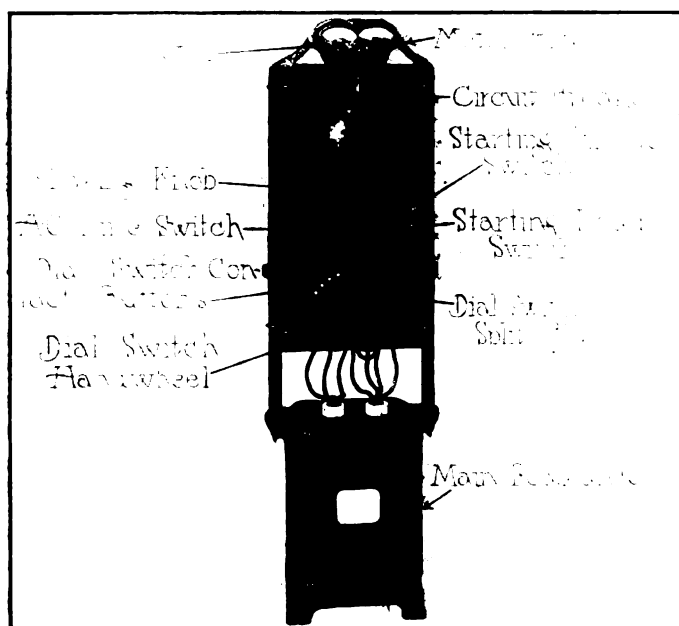
values, although its utility is, of course, limited.

The charging panel and rheostat equipment has the advantage of little if any deterioration. When once installed it may be used for any purpose, being limited only by the number of circuits that are available, and service can be relied upon for a long period of time. In addition, such equipment may be added to as the occasion requires and uniformity can be secured to any extent desired. But there is the loss of current that must be paid for, and when service is extended over a considerable period of time the aggregate paid for waste will be considerable. Economizing current, especially if the price be high, means a material saving, and this can be accomplished without loss of service or large investment. In the event of a single rectifier being used for charging, such as might be essential when but one vehicle is in service, with the addition of automatic control operation can be continued without attention, there being no probability of damage to either machine or battery. Overcharging can be safeguarded against by the use of automatic time switches, this insuring against untoward results that might obtain when the rise in the battery voltage is relied upon to cause such a fall in the charging current that the reactance will become ineffective, and the arc in the rectifier tube terminated by the reduction.

Should the original installation be one or more rectifiers, and the conditions be such that a motor-generator be installed, the rectifiers would always serve a very useful purpose in that they could be utilized for charging single batteries, and the expense of operating the motor-generator obviated, for the transformation of current by a motor-generator set is only profitable when the machine can be operated practically to its capacity. For this reason there would be no sacrifice in the installation of the rectifiers, for they can be made distinctly useful, and the saving will in the course of a year amount to many times the interest on the investment.

In practise better results will undoubtedly obtain if the rectifiers are used under observation, for there are conditions that may arise that will require attention. Increase of line voltage, decrease of battery voltage due to high temperature, low voltage resulting from short circuiting of cell plates, and other variables cannot be provided for in a machine. The consequence from these conditions will be damage, and for this reason supervision is always certain to be productive of greater satisfaction.

In careful regulation of the rectifier is the largest measure of economy. With all of the standard machines in the market means are provided for graduating the current very closely to the requirements of the particular battery that is to be charged. Batteries vary greatly in number of cells, number of plates and the voltage and amperage necessary for charging, and the exact rates specified ought to be used. Variance from these will serve no good purpose and will cause complications, or at least decided uncertainty as



Runabout Type of General Electric Rectifier, Adapted for from 60 to 140 Cycles, Either 110 or 220 Volts, and for 30, 40 or 50 Amperes, Showing Equipment of Instruments.

hours, according to the conditions. The rectifier is designed for operation with limitations as to direct current amperage, range of direct current voltage, and alternating current supply, and there is a definite minimum and maximum for each of these three factors.

In each design or type these factors have specific relation, so combined as to obtain highest efficiency, and it is not possible for these relations to be varied at will. In other words, each size is intended for what may be regarded as a definite result, and there is no one that can be applied to all forms of battery charging, as is practical with rheostats and charging panels. The charging panel can be utilized for almost any service, but all the current in excess of the actual charging requirement is lost in the rheostat resistance, and this loss is largely saved with the rectifier. This being so, the type of rectifier that can be used singly, or coupled in parallel, has manifest economic

to results. The rectifier that is adapted for a specific service will afford sufficient elasticity to deal with ordinary variations of batteries they are to charge.

The practical determination of the size and type of rectifier to be used having been made, with reference to immediate and future needs, the probability of expansion considered, and the character of the current supply and its variations being known, one will understand that the efficiency of the equipment is largely dependent upon its operation. Here can be interpolated the fact that the machine that can be used with the single vehicle in the private garage will serve equally well for the public service station that has occasional demand for battery charging, and in such stations a rectifier can usually be used with admirable results because of the variability of the charging demands, this applying to pleasure cars or light vehicles.

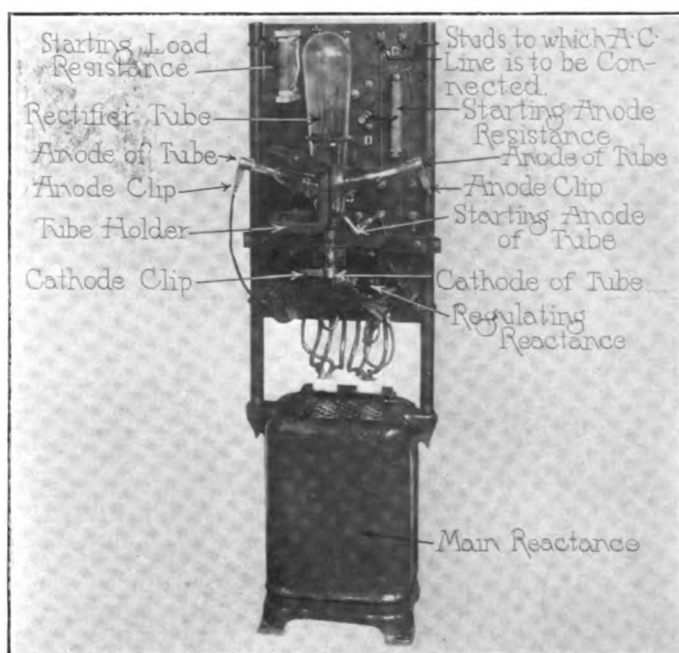
When the vehicles are to be used for freight carrying, and the batteries are larger, the machines must be of increased capacity. Rectifiers of 40 or 50 amperes capacity, connected in parallel by adding reactances, can be combined to make high capacity charging sets. Attention should be directed to the fact that rectifiers that may be satisfactory with lead batteries cannot be used with Edison cells to equal advantage because of the somewhat higher charging amperage. There should be an excess amperage, which will allow the start of the charge to be made at a sufficiently high rate to insure the maintenance of the rate throughout the greater part of the charge, provided that the line voltage remains fairly constant and does not droop toward the end of the charging period. The discharge voltage of the Edison battery averages considerably higher when the charge is made at full normal current or over, so that there shall be a comparatively small reduction during the continuance of the charging.

An illustration of the requirements for Edison batteries is the following, in which a 30-ampere General Electric type runabout rectifier was used. The test was made with A-4 Edison cells, which have a normal charging rate of 30 amperes. This rectifier was equipped with a 40-ampere tube, so that the charging rate could be begun at a higher rate. A 64-cell battery was utilized with this equipment and they were charged for seven hours. When the charging was begun the direct current amperage indicated 38. At the end of an hour, the indication was 35, at the end of the second hour 35, at the end of four hours 34, at the end of five hours 33, at the end of six hours 32, and at the expiration of seven hours 30, this last figure being the normal rating of the cell in amperes when charged. Throughout the charge the efficiency averaged 77.5 per cent.

Some rectifiers are constructed so that by using different connections that are provided they may be utilized with either 110 or 220-volt currents, and the value of the direct current voltage up to the capacity is obtained by the variance of the switches, but with these the amperage capacities cannot be varied. These

are standard constructions, however, and when peculiar conditions are met with special types are necessary. When the rectifiers are to be used where they will not be given attention they can be provided with various means of protection, but obviously the precise observation of batteries cannot be obtained where automatic devices are depended upon.

As has been emphasized, a great deal is dependent upon exact knowledge of a battery's condition, and definite tests are necessary to obtain these data. There is one characteristic of all rectifiers, and that is the diminution of the current as the voltage of the battery rises until it practically reaches a point when the amperage will be very small, so small in fact that the current will cease to flow, and while this tapering off is in one sense an ideal manner of charging, there is a possibility of cessation through fluctuation of the current supply. Were the current again be permitted to flow the battery might be damaged. This possibility



Rear View of the Runabout Type of General Electric Rectifier, the Panel Being Shown Without Instruments.

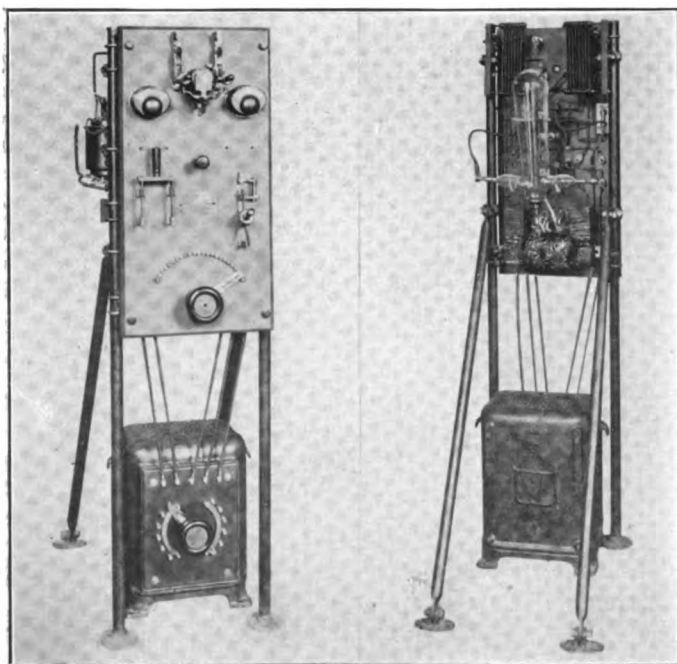
is averted through the installation of the time switch, which will terminate the charging at the end of a given period. While the charge may not be completed when the current is cut off, should the charge be found incomplete, it can be brought to completion within a comparatively short time when attention can be given.

Under any circumstances the starting must be by one in attendance, and the rectifier regulated so that the precise charging rate is supplied. This, however, is a matter requiring but little time, and when the current has been fixed at the required value the machines, if equipped with automatic devices, can be left.

In what is known as the public garage type of rectifiers built by the General Electric Company, rheostats are utilized to regulate the amount of current. This is done by connecting with rheostats and charging the batteries in series-multiple, so that there is comparatively little loss of current. To obtain the

best results the attendant should arrange the batteries so as to obtain the proper equalization of the charging voltage on the series groups. This is done by manipulation of the series and series-multiple connections on the charging panel. When once the operation is understood excellent efficiency can be obtained.

The mercury arc rectifier is not adapted for boosting charges at high amperage, which form of charging has been found practicable with both lead and Edison batteries, simply because of the limitations as to amperage, although they can be utilized up to the maximum amperage of the machine. Boosting is advocated by battery manufacturers for obtaining additional mileage from batteries with comparatively short charging periods, and from 100 amperes for lead batteries to even as high as five times the normal rates for Edison cells are recommended under certain conditions. That is, the cells can be charged at much higher rates than normal, the only condition being



Special Type of General Electric Rectifier, Adapted for 25, 30 or 40 Cycles, with the Regulation on the Reactance Case.

that the temperature must not be permitted to rise above the degrees specified by the makers. Generally speaking, such boosting charges can be made until the cells reach the limit of temperature, when they must be discontinued.

Such charges cannot be given with rectifiers which have maximum limits of from 15 to 60 amperes, but boosting charges up to the capacities of the machines are in every way practical. These, however, will require more time than would ordinarily be allowed. For, instance, with direct current supplied through charging panels and rheostats a much higher boosting charge could be given for a short period, and to accomplish the same result with rectifiers would take several times as long.

However, for work where regular charging is desired, there is no doubt of the economy of the recti-

fiers, and they can be operated at a material saving in current cost. The only expense of maintenance is the occasional renewal of the tubes, and with reasonable care these will endure for long periods. Within a comparatively short time types of small rectifiers have been developed that are exceedingly simple and comparatively cheap in price. They have none of the automatic features of the larger and more expensive machines, but they can be utilized to excellent advantage where the batteries are small and careful attendance can be given.

Theoretically the life of a rectifier tube depends upon its use, and with normal conditions the cost of renewal should be comparatively small. The tube is of thin glass of such a size that the mercury vapor can be condensed and the heat effectively radiated. Carelessness in handling, or perhaps too high a voltage when starting, will affect it. With careful usage the tube will deteriorate in time from an amalgam bridge being formed between the negative mercury terminal and the starting mercury electrode, which will prevent starting. Another cause is the tube breaking from a short circuit between the positive and negative electrodes, and still another is the diminishing of the vacuum.

Care should be taken to insure against overloading, for this will cause deterioration, and short circuits between the positive electrodes, cracked or melted seals at the terminals, or cracked tubes may result. The first result from overloading will be heating of the bulb, which increases the pressure of the mercury vapor and will decrease the rectifying capacity of the tube, possibly causing a short circuit between the positive terminals, and this might occasion a leak by cracking the platinum seals. There is another possibility, and that is the condensation of an abnormal volume of the mercury on the walls of the condensing chamber, reducing the volume of mercury at the negative electrode, so that the arc will be brought too close to the glass. The result would be the cracking of the tube.

No useful purpose can be accomplished by endeavoring to use any rectifier beyond its capacity.

(To Be Continued.)

A statement is made in the article dealing with the new Baker five-ton electric truck, on page 768 of this issue, which refers to a "spur gear chain", which was meant to state that the steering gear included a "train of spur gears". There is also in the same paragraph the interpolation of the word "ball" with reference to Timken bearings, which seemingly conveys the impression that these well known bearings are an annular ball type. That there shall be no misunderstanding, this correction is made.

The Beardsley Electric Company, Los Angeles, Cal., will manufacture, in addition to its line of passenger cars, 1000-pound and one-ton commercial chassis.

NEWS OF THE MANUFACTURERS.

The McQuay-Norris Manufacturing Company, St. Louis, Mo., maker of the well known Leak-Proof piston ring, is occupying its new building at 2812 Locust street, in that city. This structure is of two stories, provides a floor space of 12,000 square feet, and contains the manufacturing plant, city sales department, general offices, etc., of the company. New machinery and other equipment has been added to the manufacturing departments.

The Willard Storage Battery Company, Cleveland, O., is erecting a new plant which will provide six acres of floor space for the production of the widely used LBA batteries. The new plant will include 10 buildings and will be equipped on such a scale as to amply provide for the company's needs for an indefinite period.

The WonKote Enamel Company, Inc., Detroit, Mich., has been formed to manufacture an enamel discovered by Paul Fuchs, a former lieutenant in the German navy. F. Ed. Spooner and F. J. Wirtz are among the incorporators.

The Swinehart Tire & Rubber Company, Akron, O., has declared its regular dividend of six per cent. on the common stock. After charging off depreciation and making payments of fixed obligations and dividends, the surplus on hand amounts to \$137,000. The plants of the company are running at almost 80 per cent. of capacity and the outlook is excellent.

The Adams Brothers Company, Findlay, O., will be reorganized and will remain in Findlay. This action is the result of the efforts of the Business Men's Association of that city, which raised \$12,500 to lift the receivership. It is planned to settle with the creditors at 20 cents on the dollar, or 40 cents in stock.

The Hyatt Roller Bearing Company, Detroit, Mich., maker of the well known Hyatt roller bearings for motor vehicles, maintains a large number of service stations, where bearings may be obtained for motor car repairs. In the accompanying illustration is shown the station maintained at 1120 Michigan avenue, Chicago, Ill.

The American Drop Forge Association, Detroit, Mich., has been organized by the superintendents of 20 drop forging plants in various sections of the country. The purpose of the association is said to be purely educational and for the uplift of the industry.

The Overman Tire Company, Inc., New York City, had a petition filed against it in the New York courts by creditors, alleging that the company is insolvent, and that it recently made a preferential payment of \$10,000 to the Manhattan Rubber Company.

The Standard Motor Truck Company, Warren, O., has purchased a portion of the plant of the Day-Ward Company, on North Park street, in that city.

The Homer Motor Company, Los Angeles, Cal., has set aside \$65,000 for the erection of a factory that will have a capacity of 24 motor trucks a month.

The Russell Wheel & Foundry Company, Detroit, Mich., manufacturer of structural steel and special machinery, has added a motor vehicle department for the manufacture of differential gears.

The Piggins Brothers Motor Truck Company, Racine, Wis., was recently organized to manufacture motor trucks. The company went into bankruptcy a year ago and its entire equipment was sold to the Badger-Packer Machinery Company, Milwaukee, Wis., a majority of which has now been repurchased by the Piggins interests.

The Morton Truck and Tractor Company, Harrisburg, Penn., has purchased the new building of the Model Typewriter Company, in that city, and has occupied the property.

The General Motors Truck Company, Pontiac, Mich., has moved the salesroom of the Boston, Mass., branch from Boylston street to the service station at 944 Massachusetts avenue.

The Spring City Foundry Company, Waukesha, Wis., manufacturer of cylinder and engine castings, is making plans for the erection of an additional structure which will double its foundry capacity.

The Velle Motor Vehicle Company, Moline, Ill., has established a sales branch in Minneapolis, Minn., to take the place of the selling agency of Deere & Webber Company of that city. C. M. Stucker, formerly in charge of the Deere & Webber Company, will remain manager of the new branch.

The Shaw Motor Company, Chicago, Ill., will establish a

plant in Sauk City, Wis., and has prepared plans for a factory which will cost between \$30,000 and \$40,000 with machinery and tool equipment. It will be equipped with the most modern machinery for the manufacture of multiple-cylinder gasoline engines.

The Motor and Accessory Manufacturers has elected the following concerns to membership: Bearings Company of America, Lancaster, Penn.; Bock Bearing Company, Toledo, O.; Dreadnaught Tire & Rubber Company, Baltimore, Md.; Golde-Patent Manufacturing Company, New York City; L. P. Halladay Company, Streator, Ill.; Robert H. Hassler, Indianapolis, Ind., and the Sloan & Chace Manufacturing Company, Newark, Ill.

The Thomas B. Jeffery Company, Kenosha, Wis., has appointed John A. Rose manager of the newly created export department.

The Bosch Magneto Company, New York City, has added the following supply stations: Olympia Auto Supply Company, Olympia, Wash.; Max Gottberg Auto Company, Columbus, Neb.; James Automobile Company, Ogden, Utah; I. P. Todd, Circleville, O.; G. O. Reynolds, Inc., New Rochelle, N. Y.; Mark Sheffield Motor Company, Colorado Springs, Col.; Eleventh Avenue Garage, Altoona, Penn.; Graham-Seltzer Company, Peoria, Ill.; North West Garage, Cherokee, Ia.; Union Garage, Lansing, Mich.; Plank & Morgan, Worcester, Mass.; Crater Lake Motor Car Company, Medford, Ore.; T. A. Bryson, Savannah, Ga.; Pendleton Auto Company, Pendleton, Ore.; Clyde Garage, Charleston, S. C.; Milton Garage, Milton, Ore.; Motor Car



Hyatt Roller Bearing Company's Service Station at 1120 Michigan Avenue, Chicago, Ill.

Supply House, Decatur, Ill., and Triple Star Garage, Kahoka, Mo.

John A. Pletsch has been elected president of the Royal Motor Truck Company, New York City. Mr. Pletsch recently purchased the stock of the Royal Company, owned by Joseph Seeman, Howard Sills and Oscar H. Montgomery.

John M. Lansden has resigned from the positions of vice president and consulting engineer of the General Motors Truck Company, Pontiac, Mich. According to present plans, it is stated that Mr. Lansden will undertake a venture in the commercial vehicle field on his own account.

The Stegeman Motor Car Company, the Sternberg Motor Truck Company, the Garage Equipment Manufacturing Company, the Evinrude Motor Company and the Wisconsin Motor Manufacturing Company, all of Milwaukee, Wis., and the Aluminum Goods Manufacturing Company, Manitowoc, Wis., together with numerous gas engine builders throughout the state, have joined the movement inaugurated by the Merchants' & Manufacturers' Association of Milwaukee and the Wisconsin Manufacturers' Association, to promote trade extension in South America and in other countries not affected by the European war. The executive committee has raised \$5000 with which to start the work.

The Federal Motor Truck Company, Detroit, Mich., has taken over the Federal Truck Company of New York, and will operate it as a direct factory branch.

OMNIBUS DRIVERS EFFICIENT IN WAR SERVICE.

THE last few weeks have brought some very interesting facts to light in regard to the life of the motor truck driver and the incidents he is daily experiencing. It will be recalled that all of the London and Paris motor 'buses were requisitioned during the early days of the war, and in most instances the original drivers are in charge of these effective transportation machines. Without a doubt the London 'bus driver is the most efficient in the world. The traffic conditions of the English metropolis demand the best there is in an automobile driver, and the men who handle the big, cumbersome, double-deckers, are without a peer. Driving under war conditions is entirely different, however, from operating in the streets of London and Paris. The latest dispatches from the field tell of some wonderful drives that have been made to the front.

One of the defects reported in regard to commer-

ential. This repair was undertaken at once. Naturally, a certain amount of discretion is observed as to what is and what is not fit to be repaired. Work which is possible of execution is sometimes refused if its acceptance would hold up easier repairs on a number of vehicles."

The strain under which war trucks are being driven is well illustrated by an unusual accident: While driving, the flywheel of a 50-horsepower ——— (name censored) burst and blinded a corporal in one eye. The steering wheel was split, and the exhaust pipe cut. "The accident", said the driver, "was due to the very high average speed which the vehicles have to maintain. It is necessary to race the engines on low gears when on the hills, and the car was climbing a steep hill when the accident occurred."

Such incidents as driving 32 hours without a stop are reported to be common. This in itself is a terrific

test but, when the road conditions are taken into consideration, it is easily seen that some world records are being established by motor trucks. One dispatch from a motorcycle scout says: "We have been out since 2:30 p. m. yesterday; it is now noon, and we are not quite back to the rail head yet. Last night it again poured, and the roads over which we passed were in a terrible condition. One five-tonner slid into soft ground at the right side of a road, and another vehicle, a Daimler, in endeavoring to pass it, buried its left back wheel axle



Showing Method Employed by European Nations in Destroying a Chassis Before Abandonment—The Front Wheels, Steering Wheel, Magneto and Water Pipe Connections Have Been Removed and the Gasoline Tank and Radiator Damaged.

cial vehicles is their inadequate ground clearance. In a recent dispatch to the Commercial Motor, a London publication, one of the drivers at the front states that the condition of the roads is such that the rear axles scrape the surface and the chains are frequently cutting their way through the mud. He adds that many of the trucks at the front will be practically useless under winter conditions.

After the war is over there will be some very interesting stories told of the emergency repairs made to trucks on the battle fields. In the camps, however, there are first-class repair shops, capable of meeting any emergency. In his dispatch, the 'bus driver, whose name and regiment were censored, in speaking of entering a town, the name of which was also censored, says: "In the centre of the square was the motor workshop, obtaining its power from a twin water cooled eight-horsepower Douglas motor, but the repairs were more or less of a simple nature. Just as I arrived, a Leyland was towed in with a broken differ-

deep on the left side, thus blocking all passage. I went ahead on my 'cycle to explain the cause of our tardy appearance but, in the meantime, by Herculean efforts and the use of spades, jacks and another vehicle to tow, both lorries were safely extracted. During the whole of this time a heavy artillery duel was taking place, and the flashes as the shells burst could be clearly seen. However, they were not close enough to disturb our peace of mind."

Frequent delays are caused by lack of bridges; these having been blown up during early skirmishes. These are, in most instances, however, now replaced by temporary wooden structures, some of which are stated to be none too strong for five-ton trucks. At one place, a correspondent says, the Germans had erected a pontoon bridge, built over large barges, and in another a very substantial wooden structure, well staked into a rapidly flowing river about six feet deep in the centre. It is added that the latter was a remarkable piece of engineering construction, and was

so strong that even the heaviest trucks did not shake it.

Another driver of the English motor truck division tells of serious accidents resulting from trucks travelling in too close order. "I have seen many vehicles damaged", he says, "owing to the drivers keeping the machines too closely in touch in convoy. The front ones stop suddenly for some reason and the rear ones run into them. In one case a Leyland ran into a Commercar, smashing its own radiator, and pushing the latter car into the back of another vehicle, with the result that the Commercar radiator was also forced back, slightly obstructing the fan.

"The Leyland is still running well with many of its radiator tubes plugged with wood; it certainly now looks like a very old crock, as both radiator side flanges were broken in the middle. One of our men effected a very neat repair on the former: The radiator is held down by bolts passing through large fibre bushes; these were split and the two halves of each placed at the inner sides of the side flange holes, thus holding the radiator forward about $\frac{3}{8}$ of an inch, which was sufficient to allow it to clear the fan."

Aside from all these conditions, it must be remembered that trucks are being disabled by the thousands by shot and shells. American motor ambulances are doing splendid work all over the war zone and these, like all other vehicles, are being fired upon. One of the British motor ambulances received 180 holes from bullets, shrapnel and pieces of shell, in one battle. The metal deposited inside it was weighed and found to tip the scales at 300 pounds. In spite of this, however, the ambulance is still doing duty.

MAGNETO PATENT INVOLVED.

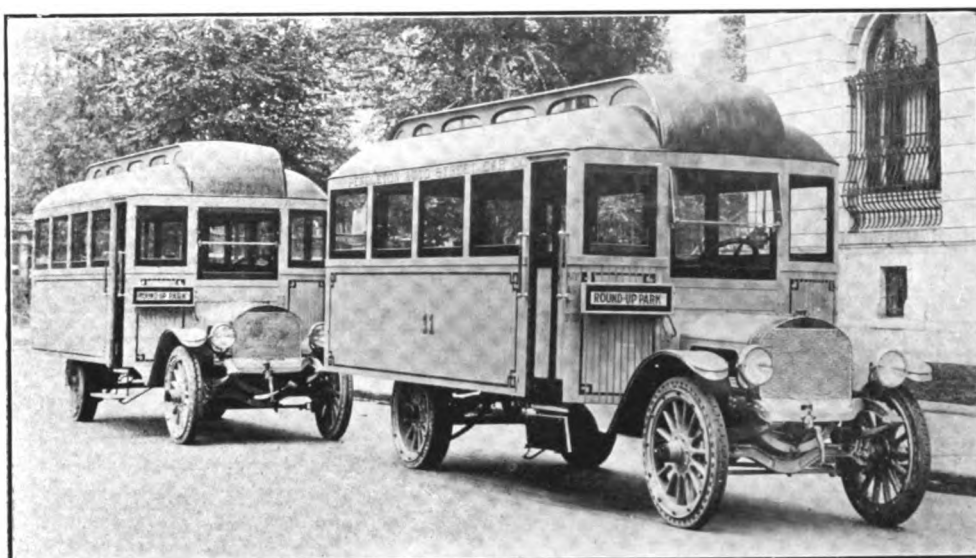
Splitdorf Electrical Company Begins Litigation Against Bosch Magneto Company.

In the complaint in a suit filed in the United States court for the Second District of New York by the Splitdorf Electrical Company, Newark, N. J., in which the Bosch Magneto Company is made defendant, the statement is made that the defendant company has been manufacturing and selling a type of magneto that is considered by the plaintiff to be an infringement on its patent rights. The complainant asks for an injunction to prohibit continuance of such manufacture and that an accounting shall be made and that damages be assessed.

The patent involved is No. 1,074,416, issued Sept. 30, 1913, to John M. Dinkins, Franklin B. Hays and William I. Taylor, and the statement is made that the patent covers means in a magneto ignition system for changing the polarity of the armature to coincide with the polarity of an external current during the time that the primary winding on the armature is coupled with the external source of current. Or, the patent may be applied to cover the so-called "boosted" or "duplex" type of magneto, in which the external source of current is used to boost the effect of the magneto windings, primarily for the purpose of easy starting, as a spark is produced at a very slow engine speed.

MACK TRUCKS IN STREET CAR SERVICE.

Pendleton, Ore., a town of about 10,000 inhabitants, and without street car accommodation, is served by an automobile omnibus line recently put in opera-



Auto Street Cars Which Are Giving Good Service in Pendleton, Ore.

tion by the Pendleton Auto Street Car Company, which shows an interesting application of the commercial vehicle. Two Mack $1\frac{1}{2}$ -ton trucks, manufactured by the International Motor Company, West End avenue and 64th street, New York City, are employed, equipped with 25-passenger pay-as-you-enter bodies, which were built by the Columbia Carriage and Auto Works, and operated on a two-mile straightaway run at a five-cent fare. The interiors are finished in Philippine mahogany, with cross seats, upholstered in leather, and the cash registers, electric signals and electric signs are included in the equipment. The entrance is in front and the driver acts also as conductor. The cars are very popular, and are said to have earned enough to pay for their bodies during the days of the annual round-up, at which time they were first put in operation. They are the first automobile street cars to be put in service in the Northwest and their operation will be watched with interest as a solution of the problem of passenger transportation.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF AUG. 24, 1912.

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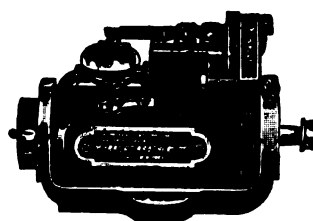
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(Signed) WM. H. BLACK, Member of Firm.

Sworn to and subscribed before me this 26th day of October, 1914.

(Signed) ROSCOE M. DEXTER, Notary Public.

(Seal) (My commission expires June 30, 1917.)



Mea

Magneto

S. R. O. Ball Bearing
MARBURG BROS., Inc.
Sole Importers
Detroit NEW YORK Chicago

The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of All Classes.

VOL. V.

PAWTUCKET, R. I., DECEMBER, 1914

No. 12

BUILDS BUSINESS WITH MOTOR TRUCKS.

New Routes Established in Sections Impossible to Reach with Horses, and Better Service Afforded in Manhattan and Brooklyn, Rapidly Develops Trade for a Progressive Manufacturer of Delicatessen Specialities.

GREATER NEW YORK has a population of approximately 5,500,000, which does not include the floating or visiting element, which is conservatively estimated at 500,000 daily. Considering these, there is, roughly, in the Metropolis from day to day, at least 6,000,000 people.

The city is the commercial centre of the nation, both for exports and imports, but it is the market place for a population within a radius of 30 miles. A circle drawn 30 miles from the City Hall in New York would include 14 cities with population in excess of 25,000, and an aggregate of about 1,500,000, and other cities, towns and villages that have at least 1,000,000 inhabitants.

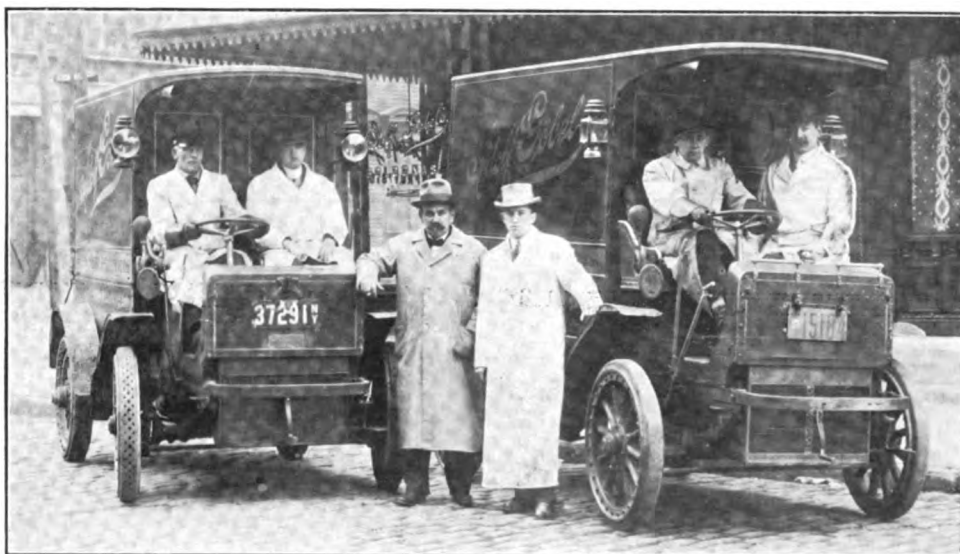
This shows that the Metropolis itself has 5,500,000, the 14 cities have 1,500,000, and the other communities roughly 1,000,000, or a total of 8,000,000 for the area, which is 2827.44 square miles. Within this circle slightly less than half is in the State of New Jersey, approximately a quarter is in the State of New York, and the remainder is the waters of the Atlantic ocean, Long Island sound and their tributaries.

Roughly dividing the population by states one can say that 6,000,000 are residents of New York, and the remainder of New Jersey. Of the 14 cities referred to

those in New York State are Yonkers with 100,000, Mount Vernon with 36,000 and New Rochelle with 35,000, and those in New Jersey are Newark with 425,000, Jersey City with 300,000, Paterson with 137,000, Elizabeth with 85,000, Hoboken with 80,000, Bayonne with 72,000, Passaic with 70,000, West Hoboken with 43,000, East Orange with 42,000, Perth Amboy with 42,000 and Orange with 33,000, or a total of 1,329,000. New York's 6,000,000 people are in Greater New York, Yonkers, Mount Vernon, New Rochelle,

that part of Westchester county that is within the circle, and the section of Long Island east of the Metropolis.

An examination of the accompanying map of the areas included in the five, 10, 15, 20, 25 and 30-mile circles, of which the New York



Two of the Autocar Wagons Used for the Delivery of Delicatessen by Adolf Gobel, Inc., Located at Astoria, N. Y.

City Hall is the centre, shows that Jersey City, Hoboken and West Hoboken are in the five-mile zone; Newark and Bayonne are in the zone between the five and 10-mile circles; Elizabeth, Passaic, Orange and East Orange are in the third zone; Paterson, Mount Vernon, New Rochelle and Yonkers are within the fourth zone, and that Perth Amboy is in the fifth zone.

The Problem of Distribution.

Those who visit New York City regard Manhattan Island as the one section in which business is ex-

tremely active, but manufacturers and merchants who are established in Manhattan endeavor to reach those who are residents of the suburbs, and the cities, towns and villages shown on the map. By reference to the map one will realize that if the public is attracted to any given store, shop or manufactory, the one problem to be dealt with is that of distribution.

Obviously patrons may come from any one of the communities shown on the map, but a delivery organization that will reach all of them, affording practically uniform service and equal satisfaction, must of necessity be of very large proportions and, to be efficient, would necessarily need good equipment. The economist might believe that the best business judgment would prompt concentration of endeavor within a specified area for the purpose of minimizing distribution cost, but one might point out that this is a condition that very generally results from the lack of facilities or the volume of patronage not justifying better means of distribution, though not resultant from a policy of limiting patronage.

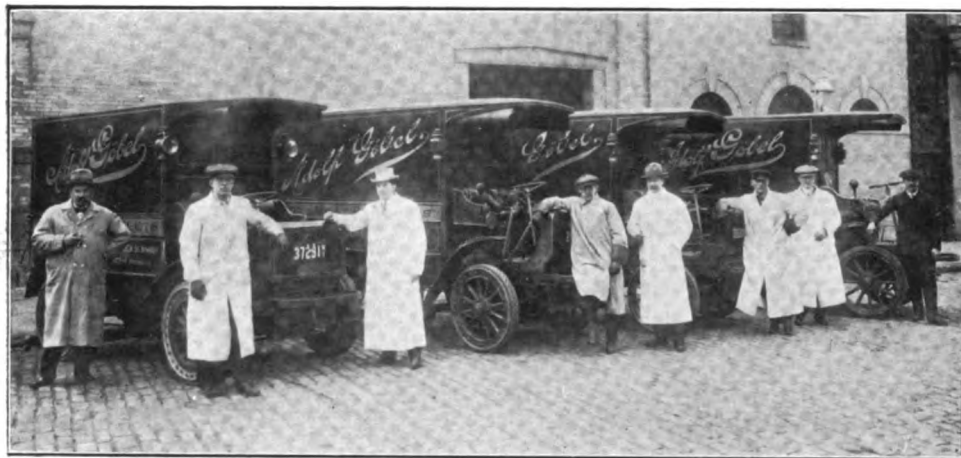
Just in the same sense that the retailer must con-

cause of the difference in the cost of delivery. Were the exact delivery cost charged every customer business would be revolutionized, for then each patron would pay for the service given. This would perhaps be regarded as reversion to methods that would be detrimental to the policies of the large stores, but it would certainly afford means of regulating the seemingly unreasonable demands of the public upon business men, and it would establish merchandise values upon a different basis.

Demand for Meat Food Products.

Less than a score of years ago Adolf Gobel, a thrifty butcher, hired a tiny little store at Rock street and Morgan avenue, in that section of Greater New York known as Astoria, this being a block from Flushing avenue, and began making meat food specialties, these being principally of pork. He made these by day and sold them evenings. The business increased and from this has developed the plant of Adolf Gobel, Inc., which includes the greater part of a city block, and which manufactures such meat products as are generally sold in delicatessen stores. Much of this food is cooked and is ready to be served.

The plant is a series of buildings that have been constructed within a very few years. Every facility has been provided for manufacturing and the products include all kinds of pork and beef sausage, ham, bacon, cured beef, meat loaves, pork pies, etc., the meats being received butchered and cut, prepared, cooked and packed in the packing house. In the establishment more than 200 men are employed, and work is in



One-Third of the Motor Wagons That Make Up the Delivery Equipment and Serve the Long Routes in Long Island, Manhattan and New Jersey.

sider delivery to customers, must the wholesaler, manufacturer, importer or agent find means for distribution to those who in turn sell at retail, and these are in turn dependent upon transportation by their own equipment or upon contractors, so that haulage appears to be almost an endless chain in which the costs to each are necessarily included in the prices paid by the customers. Minimizing the expense of distribution means that prices can be correspondingly reduced, which is a very cogent influence in competition and attracting patronage.

Each business enterprise has individual conditions to meet. General principles may be applied, policies may be similar, but practically all other factors differ. Geographical location that will be most favorable for distribution would be ideal were not numerous other considerations equally important.

Distance has seldom been considered in delivery expense as applied to sales. By this is meant that two articles or commodities sold for the same price in the factory or salesrooms do not yield the same profit be-

progress practically all of the 24 hours of the day, from 3 o'clock Monday morning until late Saturday evening.

Two Classes of Stock Distribution.

There is a retail store in connection with the plant, but aside from this all of the products are sold and delivered to retail delicatessen stores, either by the machines and wagons of the company or by express. Shipments are made considerable distances, as far east as Boston and as far south as Baltimore, but the greater part of the production is sold within the 20-mile circle drawn about New York City. Within that area all orders of sufficient size are delivered by the company's motor vehicles and wagons, and all others are sent by express.

Delivery is of two classes, the one being the packages that are transferred to express companies, to railroad terminals, docks and other common carriers, and the other is direct to small stores that are regularly supplied each day. The first class is sold by mail, telegraph and telephone orders, and the other

by the personal solicitation of the drivers, who are in a sense salesmen and carry the stock with them to make delivery.

The stock is not what might be termed perishable in the sense of shrinking in value if not immediately disposed of, but the desire of practically all of the retailers is to have daily deliveries made and to make such replenishments as are demanded by the patronage for the day.

The company used horses exclusively for distribution until about six years ago, and since that

horses, or about two-thirds of its capacity. This stable is admirably designed and fitted with metal posts, stall partitions, racks, staircase and tile floors, being in every respect sanitary and well lighted and ventilated, and so far as possible is fireproof. The expectation was when the stable was erected it would serve for a long period. The second floor is used for storage.

Adjoining this is a single-story structure with a trussed roof that has two large storage platforms on girders, and the entire floor is unobstructed. This was originally



time it purchased two classes of motor vehicles, electric and gasoline. The number of horses has not increased since the machines were purchased, the latter being added to from time to time as business demanded. The plant has developed wonderfully in that period because of the greater area in which distribution has been made, and this means that customers who could not be reached before are now supplied regularly.

In 1906 a splendid stable was built in Rock street, this being a handsome brick structure of two stories, with stalls for 40 animals, and this now houses 27

built for a wagon house, but it has been converted into a garage and the floor space not required for the machines is used for the storage of wagons.

The structure will ultimately be used entirely for garaging, and there is reason to believe that the stable will be converted, though plans recently approved comprehend the demolition of all the buildings and their replacement with five or more story structures. This will mean the use of the entire square, and in this event a new garage will be provided.

The delivery equipment of the company now con-

sists of eight Autocar wagons, four General Vehicle wagons, 25 single wagons, and 14 single-horse wagons and a motor wagon that are owned by commission salesmen. The drivers of the wagons owned by the company are paid a weekly wage and the business they do is expected to approach a definite standard, but the commission salesmen purchase the goods at the factory and serve their own customers.

The drivers who have long motor vehicle routes have helpers, but the other men usually work alone. The routes of the regular drivers are generally laid out so there will be no conflict with reference to customers, but the commission salesmen are free to go wherever they desire.

Long Route Served by Autocars.

The distribution is arranged with six of the Autocar wagons making trips to Newark and Greenville in New Jersey, to Staten Island, to the East Side and the West Side in Manhattan and Harlem. These trips require a full day and each machine is fully loaded three days of each week. The other days the loads are not maximum. The other two Autocar machines give distribution to the docks, piers, terminals and express companies in Brooklyn and Manhattan, making from four to six trips a day as may be necessary. The electric wagons cover the next longest routes, these being in Brooklyn and Manhattan, and the horse wagons are sent over the routes within a radius of six miles.

The commission salesmen serve routes they have established and they naturally endeavor to concentrate their customers as much as possible. One of them, however, has a 3000-pound gasoline wagon and his route is as long as any served by the company's machines. These men locate their horses and wagons in stables convenient to the plant.

Loading Requires Much Time.

From 4 o'clock until 7 each week day morning the wagons and machines are loaded in Rock street, the work being rushed as rapidly as is possible, but the loading can only be done by weighing and recording every ounce of freight placed on the vehicles, and this requires time, although the men are expert. The shipping and receiving department is a large room in a one-story building about midway the length of the plant, which is connected with the interior by a wide opening in the division wall. There is a six-foot door at one end of the room that gives ingress or egress to Rock street, and there is no other entrance to the plant save that from Morgan avenue, which is constantly under observation.

Between the street entrance to the "weighing room", as it is known, and the connection with the main buildings of the plant, is a line of five platform scales, and a single grating door. Each scale is separated by a partition about four feet in height, with grating doors between the outer ends of the partitions that may be locked. Thus any one or all of the scales may be used, and yet all who pass across them or through the door are within the sight of the head weigher and his clerks.

Drivers Must Select Stock.

Each driver selects the load he is to take out, providing for whatever orders he may have and then taking such quantities as will in his judgment meet the demands of his other customers, allowing for variance from regular purchasing and providing sufficiently for new or unexpected custom. The drivers do their loading, going to the departments of the factory with a basket and selecting the stock, and after the weighing of the basket and its contents the driver can place that part of the load in the vehicle.

Frequently the men with the gasoline motor wagons will take out freights weighing close to if not quite 3000 pounds. The loads may include 25 different products, usually varying in price, and each must be selected, weighed and carefully loaded, for appearance is a material factor with food. The driver must have a record of what he takes out, for he is charged either the selling value, or, if a commission salesman, the price he is charged. With from 50 to 60 drivers doing the loading and with five men at the scales, and several making the records, the weighing room is an exceedingly busy place each morning for about three hours.

The drivers of the long routes are not always first away, for they have the largest loads to make up. The machines and wagons having the delivery of orders to be shipped have the packages made up for them and a record of whatever makes up their loads, but the drivers do not have the selection of the stock. This work is done in the different departments.

After the first loads are sent away the work in the weighing room includes making up short loads, and the incoming stock is received and weighed. About the middle of the afternoon the drivers begin to return, and from 3 o'clock until as late as 9 o'clock one or more evenings of the week the men come in, weighing whatever has been brought back, making return of the collections or paying for the stock sold, and receiving credit for stock unsold.

Used Relays of Horses.

The deliveries by the company east on Long Island are only made to Jamaica, and beyond that point are sent by express. Of course the Brooklyn delivery is by routes that cover a large area of that borough, these being by horse wagons for the greater part, and by electric wagons for the more distant routes and for some parts of Manhattan. The routes that are served in Manhattan by the electric and gasoline wagons, previous to the use of the machines, were covered by horses. Then the company kept horses stabled in Manhattan and hauled the loads to the stable, changing the animals there, and using the fresh horses for the routes. At the completion of the delivery a second change was made and the horses used for haulage to Manhattan brought the wagons back. This system of relaying the animals was necessary to afford the service, and the routes were necessarily limited by the distance the horses could cover. Not only this, the time required for driving and returning from

Manhattan added materially to the work of the drivers. With the machines the expense of relaying the animals is eliminated and decidedly better service can be given.

Builds the Wagon Bodies.

The company bought its first machines about five years ago. The policy has always been to purchase the Autocar chassis and to build bodies for them that are found by experience to be best adapted for the service. When three Autocars were in use a mechanic was hired to keep them in operative condition, and this system has been continued since then with excellent success. The electric wagons are charged in the garage, where a charging panel that will serve six batteries has been installed, and the charging and the adjustment and repair work on all the machines is done at night.

The experience with motor vehicles has been this, that the routes that are served in Newark, Greenville and Staten Island have been developed where no business was previously done; the West Side, East Side and Harlem routes on Manhattan Island have been increased in length and the customers decidedly

a trolley to the left, but it was found necessary to repeal it when an earlier ordinance was discovered, ordering motor cars to keep to the right. The New Haven, Conn., regulation as to passing a standing street car, provides that the driver shall not pass on the side where passengers are being discharged, or received, "so as to interfere reasonably in any way with such passengers", but what is reasonable, is found difficult of determination. Nearly as troublesome as these instances of local conflict of laws are the differences that exist between the regulations in force in neighboring cities, the confusion resulting from which affects a very large proportion of motor vehicles of all classes. Newark, Elizabeth and Jersey City, N. J., which are near each other and but a few miles from New York City, have different regulations for passing standing trolley cars, and other cities of the same state provide still other rules.

NEW SYSTEM OF VALUATION.

Ansonia, Conn., is trying out the new system of automobile valuation initiated by New Haven, where-



A Cargo of White Motor Vehicles, Made by the White Company, Cleveland, O., and Consigned to a Mediterranean Port, Is Seized at Constantinople by the Turkish Officials.

better served; the longer routes in Brooklyn have been made productive of much better business, and the shipping orders have been considerably increased through the better deliveries to the terminals. All of this would not be possible with horses, and, of course, this expansion means business that would not be obtainable with animal delivery. The success with machines is such that there is every reason to believe that eventually they will replace all of the horses, and the distribution will be to practically all of the cities and large towns within the 25-mile radius, which are not now reached by machines.

COMMERCIAL CARS AND TRAFFIC RULES.

Owners and drivers of commercial vehicles are particularly affected by the conflicting traffic laws and regulations in force in the larger cities, some examples of which are noted. In Worcester, Mass., an ordinance was recently passed requiring drivers to pass

by the manufacturer's list price is taken as the basis of assessment, with fixed percentages of reduction from year to year. A new car is assessed at 10 per cent. less than list; the second year, this value is reduced 25 per cent.; for the third year the reduction is 50 per cent.; and for the fourth and fifth years, 20 per cent., at which valuation it is kept thereafter. On this basis a \$5000 car will be taxed on a valuation of \$4500 the first year, \$3375 the second year, \$1687.50 the third year, \$1350 the fourth year, and \$1080 the fifth year and thereafter. The system applies to all types of motor vehicles.

HARVARD TO GIVE FOUR AMBULANCES.

Harvard students will contribute four motor ambulances for use in the war zones of Europe. The proceeds were secured through a Red Cross tag day, and it is stated that every one of the 4000 students were tagged.

McGINNESS PROMOTED BY EDISON.

The Edison Storage Battery Company, Orange, N. J., has promoted Francis V. McGinness from sales manager to assistant manager of the railway department. Mr. McGinness succeeds William F. Bauer who was recently made manager of the company's Chicago office.

Mr. McGinness is a graduate of Columbia university's school of applied science, and before graduating had considerable practical experience with the New York and New Jersey Telephone Company. After spending a few months in the engineering department of the New York and Queens Electric Light and Power Company, Long Island City, he joined the sales force of the Edison Storage Battery Company. For the past two years he has been identified with the railway department, where he has formed many friends with the engineers of the principal railroads.

RUBBER EXPORT COMPANY'S OFFICERS.

Officers have been elected by the United States Rubber Export Company, recently incorporated in Delaware for the purpose of handling the export business of the United States Rubber Company and its subsidiaries. The directors are: S. P. Colt, president of the United States Rubber Company; Lester Leland and J. B. Ford, vice presidents of the same corporation; E. S. Williams, president of the Rubber Goods Manufacturing Company; H. E. Sawyer, general manager of the United States Rubber Company; R. B. Rice, C. C. Case, W. E. Barker, J. C. Weston, E. H. Huxley, H. S. Hotchkiss and W. J. Maloney. The following officers were elected: President, E. H. Huxley; treasurer, W. C. Parsons; assistant treasurer, H. S. Hotchkiss, and secretary, J. D. Carberry.

NEW VEIN OF VANADIUM.

J. N. Thompson, a mineralogist, who has been prospecting for some years for Chicago iron interests, has discovered, near the shore of Lake Superior, a vein of vanadium, 24 inches wide, and believed to extend for a long distance. While this metal has been found in five western states, in only two does it exist in quantities sufficient to make it worth while to mine it, and the amount produced has had no appreciable effect on the market, practically all that is used being imported from Europe. This new supply should prove of great value.

LONG STROKE HORSEPOWER FORMULA.

Commercial and other vehicles having long stroke motors will be affected by the new formula to be used for determining the horsepower of automobile motors for the basis of licensing them in California the coming year, and strong protests are expected, even if the

matter is not taken to the courts for decision. The adoption of the formula, which is given as "bore plus stroke, times bore, times number of cylinders, times .224", will mean the payment of from \$5 to \$10 more by the owner of a long stroke motor.

LIGHT DELIVERY TRUCK.

Those considering motor vehicle equipment will do well to investigate the merits of the product of the Independent Motors Company, Port Huron, Mich., which concern is producing a 1000-1500-pound chassis. The Independent is equipped with a worm drive, making for noiseless operation and maximum efficiency. Every detail of design and construction has been worked out carefully and, throughout, the material and workmanship are of the best. The Independent Motors Company has an attractive dealers' proposition, and those seeking a high-grade light delivery vehicle should write to ascertain particulars.

INVESTIGATE SPECIFICATIONS.

The specifications on which bids are asked for the \$120,000 worth of new fire apparatus for Pittsburg, Penn., are to be investigated by the public safety committee of that city. It is alleged that certain paragraphs are so drawn that it is impossible for an intelligent bid to be made, and that only one manufacturer could meet the conditions. It is also charged that one paragraph has been virtually copied from the specifications of a certain manufacturer.

RUSSELL T. KINGSFORD RESIGNS.

Russell T. Kingsford, chief engineer of the Rushmore Dynamo Works branch of the Bosch Magneto Company, New York City, has tendered his resignation to accept a position in charge of the private laboratory now being fitted out by S. W. Rushmore, who recently sold out the Plainfield works to the Bosch Company.

JUDGES OF TRADE MARK CONTEST.

Carl M. Green, Theodore F. McMannus and E. Leroy Pelletier, Detroit, Mich., have been selected to act as judges of the "Made in the U. S. A." trade mark contest conducted by the Detroit chamber of commerce.

TAXI RATES REDUCED IN DETROIT.

The rate of \$1.20 from the Michigan Central station in Detroit to the down town hotels has been reduced to 50 cents as a result of protests from the travelling men.

CENTRAL STATION SERVICE ECONOMY.

United Electric Light Company, Springfield, Mass., After Four Years' Experience, Builds Finest Plant of Its Size in America for Fleet of Electric Trucks.

OPERATING in a 10-mile radius of Court square, and in an area of approximately 300 square miles of territory, the United Electric Light Company, Springfield, Mass., has for its own purposes erected and equipped a service station that is probably unequalled in any city of like population in America, having facilities for more than double the equipment now in use. Nearly four months ago the company disposed of the last of its horses, and it now uses 15 electric wagons and trucks and an electric runabout.

The company is not a philanthropic institution. The reasons for the erection and equipment of a service station that represents an investment of approximately \$150,000, aside from the value of the vehicles used, were purely economic. That is, the increased efficiency and practical saving justified the facilities that have been provided, and judgment was based on an experience of four years with electric vehicles.

Right here should be pointed out that the only advantage the company has in the utilization of electric wagons and trucks is the fact that it sells current,

and can assumedly economize in the cost of power, but the company charges itself the same price charged to all others using current for charging vehicle batteries, and this factor is eliminated from influencing the corporation. Actual saving in practically every work caused the company to authorize the building of what now seems probable will suffice for all requirements for at least a decade.

Finely Equipped Service Station.

The building is a fine structure of brick, steel and concrete, 80 by 200 feet, three stories and basement, superbly lighted on all sides, equipped with all facilities and conveniences for the comfort of the employees, and finished in a manner that will compare favorably with the average office building. The station is as proof against fire as science could construct

it. Every facility that could be provided for labor saving has been included, and the means for handling heavy material are probably unequalled in any other station in America.

The company does not intend to afford public service. It has merely provided for its own needs, and it is progressive in the sense that when its experience had thoroughly demonstrated the value of electric equipment it did not hesitate to make such investment as would insure the fullest service economy. In other words, it was a business proposition, which was met in precisely the same way as all others.

Service in 10-Mile Radius.

The United Electric Light Company serves a population of approximately 125,000, of which 110,000 is in the city and the remainder in the towns of West Springfield and Longmeadow. Its service extends to the Connecticut line at the south, to the Ludlow line at the east, to the Chicopee and Holyoke lines at the north and the Westfield and Holyoke lines at the west. The radius of 10 miles will include about all of the area



New Service Station of United Electric Light Company, Springfield, Mass., at Alden Street and Wilbraham Avenue, with Some of the Electric Machines Used by This Department.

in which the company operates. A statute provides that each year the company must place a specified portion of its power and light circuits in underground conduits. Originally the portion was five miles, and this was reduced to three miles, and then one mile, which now obtains. In meeting the provisions of this statute the company now has 75 miles of underground construction, 12 of which were built this year and 12 in 1913.

The area in which this underground work is done is usually within a two-mile radius of Court square, but there is a mile and a half of underground wiring at Indian Orchard, and this year the company purchased the municipally-owned equipment of the town of West Springfield, which town it had supplied with current for years, and put in another mile and a half

of underground work there. This underground construction is in addition to the erection of poles and wiring to meet the demands outside of the area stated. The company, by the way, supplies light and power to every factory in Springfield.

Much Underground Construction.

The underground construction represents greater investment than the overhead, but it is more enduring and the cost of maintenance is relatively smaller. The superiority of the underground system of distribution is generally unquestioned, but expense is the great obstacle to rapid expansion. This applies to interior lighting and power service. But for street illuminating the lamps must be suspended such heights above the roadways as will give satisfactory results, so that poles must be erected, although serial wiring is eliminated, with the underground construction.

The placing of 12 miles of street wiring underground is indicative of the general policy of the com-

pany. August the service station was located close to the Connecticut river, in a building in the group of structures that compose the lighting plant. This was convenient to the plant, but it was at one of the lowest points of the city, and was between a railroad track and the river. Frequently much time was lost because of blocked crossings, all of the haulage was for a considerable distance up grades, and the pole yard was two miles away. All of the construction material was drawn to the station, and from that point distributed when needed.

Originally horses were used for haulage, and much time of the men and the teams was required in going to and from the station and to the work, and all of the cable was drawn a mile and a half from the railroad freight station. Besides its own equipment the company hired horse trucks as needed for the freighting. The pole yard was located at what was an advantageous point for distribution, but principally from the fact that the poles could be brought into it on a spur

track on the Highland branch of the New Haven road, although many of the poles are hauled there by those from whom they are purchased. The old service station was adapted to meet the conditions that first obtained, but it was limited in space, was inconvenient in many ways, was not provided with adequate loading or unloading facilities, and did not permit economies that were practical.

The first electric wagon was purchased in June, 1910, this being a 1000-pound Detroit machine that was used for the distribution of meters, etc. The second wagon was of similar capacity, this being

used for "trouble" work in the maintenance department, and the third machine was a 10,000-pound truck fitted with a winch to be used in construction. At the end of 1913 the company had 11 trucks and wagons, including a runabout, in service, and the experience was such that plans were considered for the present service building. This was planned and construction begun in the early summer. It was sufficiently advanced so that removal was made to it about the middle of August, but it was not completed until late in October, and as a matter of fact some work is yet to be done, but this applies to the installation of equipment.

The site selected for the station was at Alden street and Wilbraham avenue, in the geographical centre of Springfield, the property having 100 feet frontage in Alden street and extending north 700 feet in Wilbraham avenue, with the Highland branch of

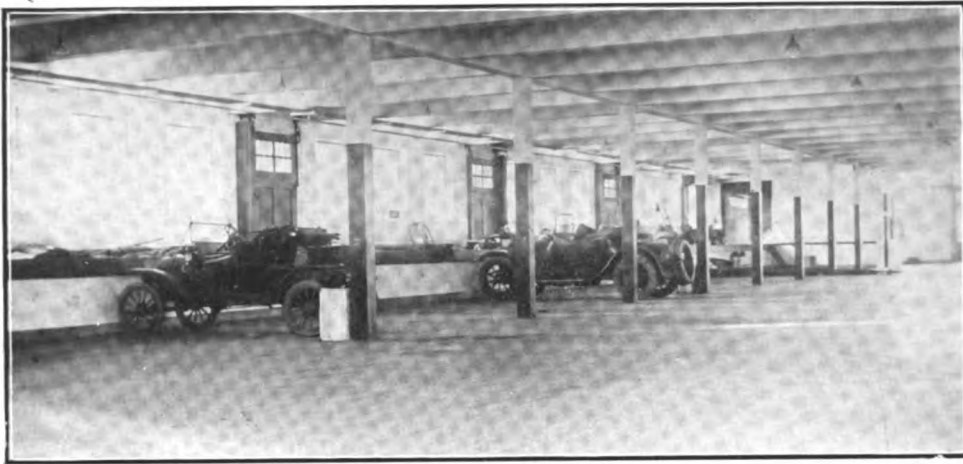


The West Side of the Service Station, Showing the Spur Track from the Highland Branch of the New Haven Railroad and the Long Recessed Loading Platform for Economically Handling Freights.

pany. The provision of the law would have been met with but a single mile of this form of construction, but economic reasons prompted doing what might have been extended over 12 years in one. As a matter of fact in two years the company has done the work legally required in 24 years. The new underground work is always changed from overhead, so that there is not much expansion represented by the translation. Outside of the area stated practically all of the construction is aerial. The construction department is considerably larger than would be normal with companies operating in cities of similar proportions.

Conditions at Old Service Station.

What is referred to as the service department is known to the company as the "distribution", and includes both construction and maintenance. These are under the supervision of W. H. Bolewine, the superintendent of distribution. Previous to the middle of



The West Side of the First or Garage Floor, with the Loading Platform 140 Feet Long Between Two Six-Ton Elevators, Which Save Largely of Time and Labor.

the New Haven road along the west side. The pole yard is north of this property, with 100 feet frontage in King street, extending south 350 feet, there being a single property between the station and the pole yard. With the service station on this site all freight shipments could be delivered direct to the platform and the cost of haulage saved. Large quantities of construction material, cable, wire, transformers, lamps and metal poles are used each year, and when received were hauled and stored, for delay meant the payment of demurrage, and no good reason obtained for holding it at the freight house. Not only this, the site is the highest point in Springfield, and haulage of loads would be on level or on descending grades, a very important factor in economizing in the use of electric wagons.

Planned for Further Increase.

The plans accepted were for a structure that will be sufficient for at least 10 years, but they were made with a view of eventually erecting another building, in duplicate of what was to be erected, directly north, if not connected with, the station. Primarily the needs for storage of material were regarded as being as important as the garaging of the wagons and trucks. Facilities for handling the stock were absolutely necessary to obtain economy. Generally the building was planned with the basement for a store room for cable, the first floor for the garage, the second for offices and storage, and the third for storage.

Permanency and appearance were two desiderata of importance. The building was to be in every way enduring, and to be sightly to the eye, as well as having every facility and convenience that would be desirable. As erected the station is all that economic or employees' welfare reasons could suggest. It is 200 feet

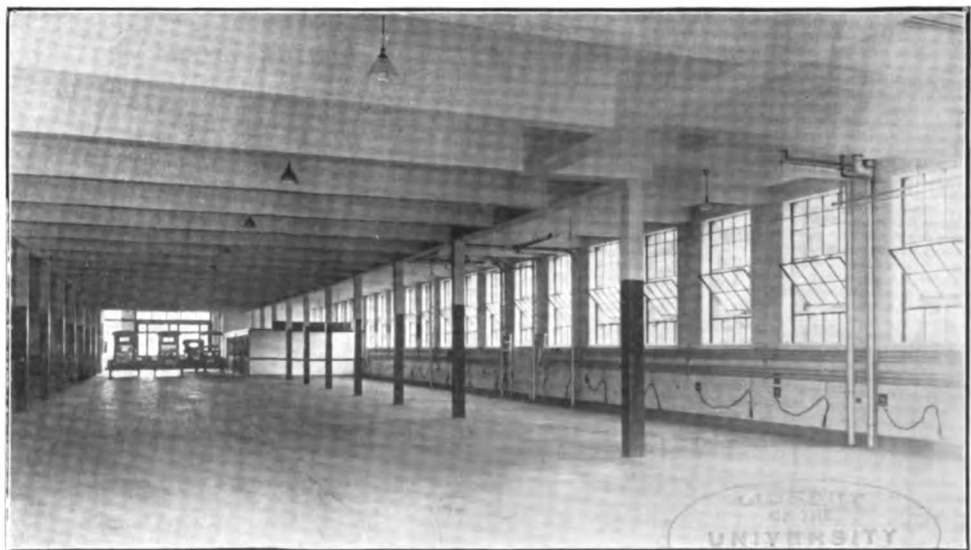
length and 80 feet width, with no possibility of light being obstructed, with the basement so well lighted by windows that no artificial light is required by day. The walls are brick, with artificial stone trimming, the floors are steel and concrete, the window frames and sash are steel, generally glazed with wire glass, and aside from the trimming of the offices no wood is used in the construction. It is wired for both power and lighting, the metal ducts being ample for in-

creased needs and located so that any work may be quickly done.

Novel Features and Facilities.

The arrangement of the station is especially interesting. The basement is the full length, 30 feet of the north end containing the two-boiler heating plant, with the coal pocket in the northwest corner. The coal may be discharged directly from the car on the railroad track into the pocket, and the ashes can be taken out through two hatches in the loading platform, the north end of which is above the pocket. North of the coal pocket is the north elevator well. The boiler room is so arranged that should another building be erected it may be heated by the addition of another boiler. The remainder of the basement is given over to the storage of reels of cable, the largest of which will weigh from three to 3½ tons. Stairs at either end of the basement afford access to the floors above.

The first floor is the garage, but a part of this is taken up by the loading platform. There are wide entrances at either end of the building for the vehicles, with doors close to the stairs to the upper floors. A glance at the view of the west side of the building, showing the exterior of the loading platform, will bet-



The East Side and Centre Section of the Garage, Seen from the South End, Showing the Storage Space for the Vehicles, and Beyond This the Charging Room and Repair Shop.

ter establish its practical value than will description. The building is beside the track of the Highland branch of the New Haven road, and a siding from this track has been constructed so that a train of four cars can be run on to it, so close to the building that the cars can be unloaded directly on to the platform without bridging at the doors of the cars. As will be noted, the platform is recessed into the building, extending 10 feet width from the north end to within 30 feet of the south end of the structure. The platform is at the height of the cars when on the track. Beneath it light is admitted to the basement through a series of windows. Six pillars support the wall above the platform. At the rear of the platform is a heavy wall in which are six doors and a series of windows.

At the extreme right of the south end is the entrance to the building, which affords access to the garage office, the department offices on the second floor and the basement. A passage connects with the garage floor as well. Entering the main or south door of the garage, at the right is a washstand, this being in

east or right side of the main floor, between the washstand and the series of small rooms, is devoted to the storage of the 16 wagons and trucks. The plan is to eventually use the space at the other side, in front of the loading platform, for similar storage, there being room for 18 machines without congestion. With both storage spaces filled this would allow the use of the central section of the garage floor without obstruction. Were this section utilized the garage could, without crowding, store at least 50 machines.

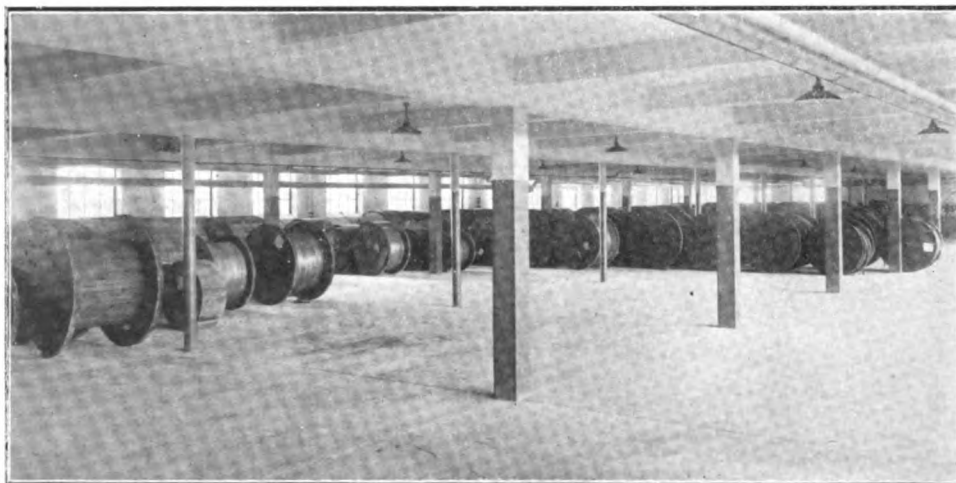
The south end of the second floor is given over to the stairway and hall, the office of the foreman of underground construction, the general office, the office of the superintendent of distribution, a record vault, a large recreation room for the employees, a locker room and a lavatory; and beyond these is a general stock room approximately 100 feet by 80, and the room devoted to the storage and testing of transformers. On the third floor, beginning at the south end, is a large vault for records, a spacious drafting room, a very large storage room and a room for the testing of arc lamps, and a lavatory. At either end of the building, at the ends of the internal loading platform, are the wells for the six-ton elevators.

The layout of the garage is to economize space, allowing sufficient room to work on the machines without moving them. The charging room contains a general switch-board, composed of panels that may be added to as required, and two motor-generator sets, the one of a 75-horsepower motor and 400-ampere generator, and the other a 50-horsepower motor and 250-ampere

generator, both of which are operated at 110 volts. The power and lighting circuits of the building are independent, but if the lighting circuit should be interrupted outside of the building the charging plant can supply current until it could be restored. Each of the vehicles is numbered, and each has a stall, a switch, rheostat and meter bearing a corresponding number, so that there can be no error in location or charging circuit, and precise record can be kept.

The machine shop is equipped with a lathe, drill press, portable forge, anvil and grinder, the machines being driven by direct current motors, and all the necessary hand tools. The oil room is constructed to prevent all danger from fire. The distilling plant is to furnish water for use in cleaning and equalizing the vehicle batteries. The floor is constructed so that it can be flushed with streams of water and kept thoroughly clean.

The economy of the loading platform is obvious. Any reel of cable in the basement can be rolled to an



The Store Room for Reels of Cable in the Basement, Approximately 80 by 170 Feet, with Elevators at Either End to the Loading Platform or Any Floor.

the southeast corner, and beyond this is the space devoted to the storage of the wagons and trucks. Still further on is the series of three small rooms, separated by half-partitions, in which are the charging plant, the machine shop and the lavatory, in that order. At the left is the garage office, the passage to the building entrance, a room in which is to be installed a distilling plant, and beyond this the loading platform extends for 140 feet. In the northwest corner is a rope room and an oil room.

Garage Will Store 50 Machines.

The loading platform is the height of the average vehicle body above the garage floor and is level with the platform outside. The platform is 10 feet width and is unobstructed. At either end of the platform is a six-ton elevator. The six doors in the wall dividing the platform are of the lifting type that fold against the ceiling. These are well balanced and are raised or lowered by windlasses. Any of the doors may be opened or closed in about 30 seconds. The

elevator, raised to the loading platform, placed in a car or on a truck, or heavy stock or transformers can be brought from the upper floors with little labor and in quick time. The cars can be unloaded either to the elevators or the trucks, or loads transferred from the trucks to the cars under shelter, and the labor and time minimized, the freight haulage is unnecessary, and the stock is centralized and under one supervision. The material for any work can be selected and no time lost; the stock is so located that the least handling is certain. The freights taken out are heaviest and the loads carried returning are minimum. The possibility of congestion is guarded against by having the machines used for underground construction loaded beginning at 7:30 mornings, and the trucks worked by the overhead construction gangs beginning at 8 o'clock. The day men are generally through their regular work eight hours later.

The two five-ton General Vehicle trucks, equipped with electric winches, are used by the underground gang; the three two-ton General Vehicle trucks are worked by the force doing aerial work; the two-ton Detroit wagons are used for cable splicing; one 1000-pound Walker wagon and two 1000-pound Detroit wagons are used days, one machine by the "trouble" men and the other two for the meter and lamp department, and four 1000-pound Detroit wagons are used for trimming and inspecting, first by the trimmers and later by the night inspectors. The runabout is used by the assistant manager and is frequently at the office at 73 State street the greater part of each day.

Relative to the work done by the machines: The greatest mileage recorded for any one day is 53, made by a 1000-pound wagon. The wagons used for trimming and inspecting average 40 miles a day, seven days in the week, the city being covered twice each night. The three other 1000-pound wagons will average 35 miles daily, except Sundays and holidays. The 2000-pound wagon will average 15 miles daily, with a maximum mileage of 40; the two-ton trucks will average 20 miles, with maximum mileage of 40, and the five-ton trucks will average 15 miles, with maximum mileage of 40. The runabout is driven about 25 miles daily, except Sundays.

The trucks are used for all kinds of work. Poles are hauled with a trailer that will carry four 35-foot poles, but a five-ton truck can be loaded with 12 of such poles. During the past season the carbon arc lamps in a considerable section of the city were replaced with magnetite lamps, this requiring considerable work, and a large number of new poles were set.

These have metal bases, with wooden sections carrying the "goosenecks". The metal bases are first set and then a truck loaded with the "goosenecks" is sent out. In one instance, at least, a load of 18 was taken from the station and set with the aid of the winch, and the machine was back, in an hour and a half. This illustrates the possibilities with adequate equipment.

The machines are worked consistently and they are well maintained. The first wagon bought is giving as good satisfaction as when delivered—in fact, better, for it is better understood. The garage is in charge of a foreman, who has two day and two night men under him. Each driver makes out a report when he returns to the garage that shows the "out" and "in" odometer readings, the Sangamo meter reading, the time "out" and "in" and the condition of the machine. This card goes to the garage foreman. The machine is then washed and later is placed on charge. While being charged it is oiled and greased, and if adjustments are necessary these are made. If repairs are necessary these are made according to the judgment



The Recreation Room, a Large, Admirably Equipped Apartment That Has Every Convenience for the Use of the Employees.

of the garage foreman, for the cars are indispensable and must be kept in service. With rare exceptions, however, the vehicles are always in use. Once a year, generally between Jan. 1 and March 15, the machines are thoroughly overhauled, and restoration is complete when this work is finished.

The records are carefully kept. The mileage, the ampere-hours consumption and the charging current data are supplied by daily readings of the vehicle and switchboard instruments. The current is charged at three cents a kilowatt-hour, this being the same as charged the public for similar service. All oil, grease, waste, electrolyte and other supplies are taken from stock and charged to the vehicle on which they are used. Spare parts are purchased and put into stock. These are requisitioned as wanted and charged to the machine. All mechanical labor is reckoned at the hour rate. The charge for garaging is made on the basis of capacity, but the washing is allotted equally. The wages are charged as earned. The overhead, which

includes rent, light, heat, registration, insurance, taxes, interest and depreciation, is figured according to the capacity and cost of the vehicle. The overhaul is charged according to the work done. In addition to these items is tires, of which a record is kept, which shows make, maker's number, size, cost, date put on, location on vehicle, repairs, date removed and the mileage, as well as change, if any. The daily operating charge is obtained from the record, aside from tires, and this is computed to show the weekly, monthly or annual cost, and the cost a mile, and to the average the mileage cost of the tires can be added when the final figure is known.

The machines are all equipped with Edison batteries, the A-4, A-5, A-6, A-8 and A-12 sizes being used. Good care is taken of the cells, they being equalized about once a week. All machines are equipped with Sangamo meters, so that very accurate check is kept on the mileage. The wagons and trucks are provided with windshields, tops and curtains, so the men are amply protected, and each has an electric headlight that is supplied with current from an independent 80 ampere-hour battery, which is used when the vehicle battery is low. These searchlights are extremely convenient for the men to work with at night, either on poles or at manholes, and drop lamps make possible work within the manholes. The bodies for the four wagons used by the trimmers were built specially and the batteries are carried inside them, back of the seat, with a large tool and material box behind the batteries. This construction has been found very useful. These machines and one two-ton truck were purchased the present year. Before the wagons were delivered three horses were used for trimming and six for inspection, but of course not as much ground was covered by the inspectors.

The records specified show the cost of the operation of the machines, but the earnings are shown by charges against each work. This is simplified by the elimination of freightage for material to the station. A work being ordered, a charge is made for transportation, which is placed against the job, and a daily time slip shows the amount of each item. The department is credited with the earnings, and against these the expenditures are charged. Practically the system amounts to an hourly charge for the work of the machines.

A force of about 60 men is connected with the station, and these benefit by the improved surroundings. The men have an exceptionally well furnished recreation room, with every convenience desirable, and a locker room where they can safely keep property. Since the change the men wear better clothing to their work, keep their working clothes at the station, and evidence their appreciation of their improved surroundings. The new station is an economy and a satisfaction for the company, and it has an admirable influence with its employees, while it is a very emphatic demonstration of the efficiency and utility of electric vehicles.

HAULAGE PROBLEMS STUDIED.

Each haulage or delivery problem has features of its own. In some, one type of vehicle has decided advantages, while in others another form only can give the required service. Electric vehicles have advantages over the gasoline car in some businesses, while in others the latter only can best obtain the desired results. And there are instances where either the gasoline or electric vehicle can be utilized with profit. For each particular service there is a certain size vehicle that is the most profitable.

The General Motors Truck Company, Pontiac, Mich., maker of the well known line of GMC commercial vehicles, and which produces eight types of gasoline and a similar number of electric vehicles, is in a position to solve haulage and delivery problems because of its long experience as a manufacturer and transportation specialist.

The company will be pleased to co-operate with individuals or concerns considering motor vehicle equipment, and will supply complete information as to the best and most profitable type of motor vehicles to employ. Manufacturing both gasoline and electric cars, the General Motors Truck Company is in a position to solve all haulage problems.

One of the features of the company is its service. It co-operates with the user of GMC vehicles in obtaining the results necessary in delivery or haulage service. Those desiring data are requested to outline the nature of the work to be performed and the character of the roads in the locality in which the vehicles are to be used.

The General Motors Truck Company has a proposition that will interest dealers, and they are invited to write for particulars.

TIRE PLANT IS TO BE OPENED.

After being closed for 25 years, the plant of the Bucyrus Steam Shovel and Dredge Company, Bucyrus, O., is to be opened by Jan. 1 as an automobile tire plant employing 1000 hands, the work of remodelling having been commenced.

DIVIDEND FOR POPE CREDITORS.

Having about \$150,000 in hand, Receiver George Pope of the Pope Manufacturing Company, Hartford, Conn., will shortly ask for an order to pay another dividend of 10 per cent. to the creditors.

BIDS OPENED DEC. 16.

Bids for pneumatic, cushion and solid tires for the vehicles of the United States postoffice department were opened on Dec. 16, but have not, as yet, been made public.

TRACTOR SAVES HALF OF HORSE HAULAGE COST.

Economy of from 50 to 100 Per Cent. Realized by J. A. Budlong & Son Company in All-Round Work with Nine-Ton Trailer or Train of Adapted Horse Carts.

PRACTICAL development of haulage equipment and efficiency depend very largely upon knowledge of the work and realization of the possibilities with changed or improved facilities. A high degree of economy can be realized from horse transportation, and this might be applied with reference to minimizing expense or to maximum work within a given period.

But practical development cannot be obtained without careful study of conditions and the improvement of facilities. Surprising as the statement may appear, the majority of those having large horse equipment have comparatively little knowledge of cost, and when improved methods are advised those suggesting them are expected to supply the information that ought to be shown by records of those desiring it.

The average business man seldom places real value on data that can be made extremely useful. Periodic comparison of record will afford accurate knowledge of both work and expense, but with this as a basis further economies can be worked out.

An admirable example of the possibilities because of accounting record is that of the J. A. Budlong & Son Company, Cranston, R. I., which concern is one of the largest intensive farmers in New England.

The company has a farm of more than 1000 acres within the city of Cranston, of which more than 700 acres are cultivated. Besides its farming the company is one of the largest growers of roses in America, having more than 20 acres of land covered with greenhouses in which roses are propagated and grown, and shipped to all of the flower markets of the eastern states.

Intensive Operation of Big Farm.

The company was originally engaged in market gardening, having stores in New York and Boston, and making shipment to and delivery from these stores, and it also manufactured pickles on a very large scale. In addition to these it had connections in

all of the eastern commercial centres. The farm is five miles from the railroad and steamship terminals in Providence. During the busy season of the year about 1000 people are employed, and while the crops are being marketed work is going on during the hours of daylight.

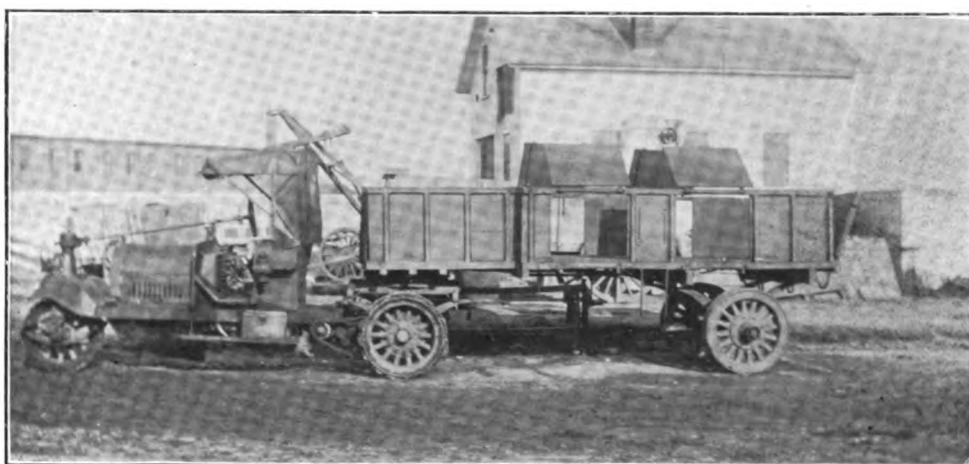
Operations are on a large scale. Fertilizers are received by the train load, and shipments are made in large quantities. Several years ago from 125 to 135 horses were used on the farm and for hauling the crops to the freight stations and piers at Providence, and from early spring until late autumn they were worked hard. During the winter months the work is less exacting and more uniform. Vegetable and fruit crops are quickly perishable and they must be handled to be received in the markets as soon as possible after harvesting, for condition and appearance are highly essential factors in commanding prices, and the earliest and most

perfect crops are extremely profitable. Intensified farming on a large scale is not a matter of guessing. Science is quite as necessary as in advanced manufacturing.

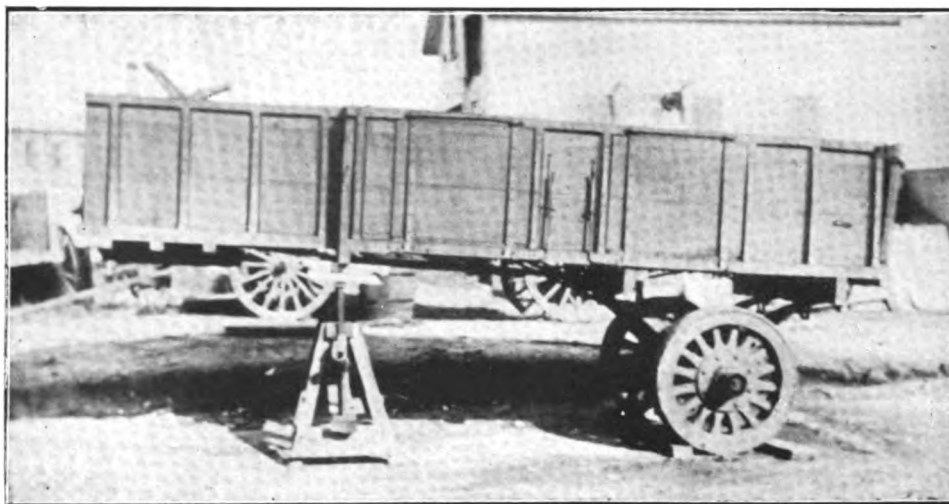
With a company of

the proportions of this concern transportation economy has always been important. The company's equipment has been high class with reference to the horses, and the wagons have been extremely well built. The company has its own blacksmith shop, does its horse shoeing, builds all its own wagons and carts, and buys its horse food in very large quantities. These facts are stated to show that economies have been considered in every detail. The company is one of the very few that can give haulage cost to a thousandth of a cent for a ton or a ton-mile, and can determine precisely the expense of a stated work for any period required.

Another element to be considered in the haulage cost is the fact that the horses have been so purchased that the initial cost of each animal is low as compared with the prevailing market prices, and the animals can be utilized on the farm for a considerable



Knox-Martin Six-Ton Tractor and Nine-Ton Trailer, Showing Side Gates Open, Used by J. A. Budlong & Son Company, Cranston, R. I.



The Trailer, Built in the Company's Shop, at Cost of \$315.54 for Stock and Labor, Elevated on Horse and Jacks, Ready for Coupling the Tractor.

period after they are useless for city work. Considering these factors, the cost of horses to the company is materially less than to the concern doing haulage in the average city.

Unusual Degree of Economy.

Because of careful accounting, the low prices prevailing from purchasing in large quantities, and the unusual length of service of the animals, the actual cost of transportation to the company has been extremely low. Close supervision of the work has also insured efficiency not usually experienced, even with large and organized transportation departments. The usual statements relative to possibilities with motor vehicles would appear to have less weight in view of the economies obtained.

James A. Budlong, a member of the company and manager of the farm, purchased a three-ton truck for making long hauls, and from the farm to the railroad terminals and the piers. While he found this machine extremely useful, he soon realized that the capacity was not sufficient to make it as productive in some work as he desired, although it showed a decided economy. The machine could make quick and constant trips, but a larger load was desirable. The machine was not large enough to haul coal as compared with the work of the horses.

The company has a boiler house with 10 boilers, from which the greenhouses are heated, and as the temperature must be kept uniform in these buildings, a large quantity of coal must be burned. While the consumption is variable with the weather, an average of about 50 tons a day is required, or from 350 to 400 tons a week, from the time freezing temperature is shown in the autumn until well into the spring. This coal is received by barge at the pier of the Sea-

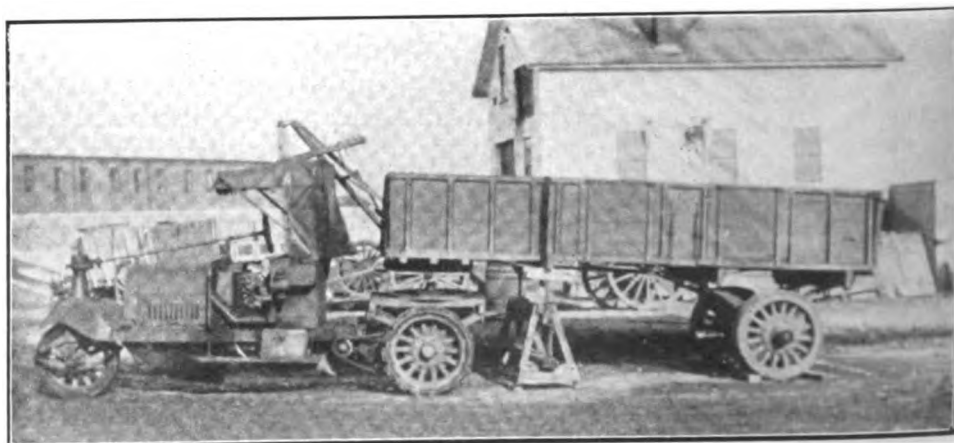
connet Coal Company in Providence and hauled to the boiler house at the farm, a distance of $4\frac{1}{2}$ miles. The difference between the pier, or yard, and the delivered prices is such that the Budlong Company can profitably haul the coal itself, and for this work used horses and carts for many years.

The lowest cost of this haulage was figured as approximately 40 cents a ton, but this did not include a profit, the purpose being to work the horses, carts and men when they were not needed on the

farm. Hauling capacity loads the cost with horses is now more than 50 cents a ton. The haul is up a steady, but slight grade from the pier to the farm. With the streets in good condition a two-horse team and cart could make two round trips, hauling five tons to a load, in a day, but if the ground were covered with snow, or the streets rutted slightly and frozen, the loads were necessarily reduced to $3\frac{1}{2}$ tons, and even three tons, to avoid overworking the horses. A two-horse team could, in favorable conditions, haul five tons, but if the work were averaged for the winter the work would closely approximate four tons to a load, or eight tons a day. The truck could make five or six trips, but the tonnage was small because of the comparatively small capacity.

Bought Tractor to Haul Coal.

This was the reason that early in 1913 the company bought a Knox-Martin six-ton tractor, which was delivered March 5. The intention was to use some of its horse wagons for trailers, and to utilize the machine in such work about the farm as appeared practical. When received the tractor rear axle did not carry the usual pair of semi-elliptic springs and a turntable for the attachment of a trailer, for Mr. Budlong proposed to place on it the construction that ap-



Tractor Backed Beneath Trailer, Ready for Lowering, the Work of Coupling Usually Requiring a Minute's Time for the Driver and a Man.

peared to him to be most practical for the purpose he had in mind.

The company's head blacksmith, who has built all of the wagons used for nearly a quarter century, constructed a trailer that is shown in accompanying photographs, but to have the use of the tractor as quickly as possible he converted one of the largest wagons and equipped the rear axle of the tractor with springs and a turntable.

Special Turntable for Tractor.

Examination of the illustration showing the rear of the tractor is of special interest, in that it shows the adaptation of the machine to meet with what may be regarded as standard wagon construction requirements. The heavy semi-elliptic springs are mounted on long seats. On the springs is a rectangular frame of wood with a forged frame of half-inch iron bolted to it. The spring eyes are each bolted between two heavy eyes that are shouldered against the iron frame and secured by nuts. The rear ends of the springs are free in guides bolted to the rear of the frame. On the frame is a deck of inch oak, and on this, bolted to the four members, is the lower ring of the turntable, this having a longitudinal plate across it in which is an opening about $2\frac{1}{2}$ inches diameter to receive the stub or stud of the upper half of the turntable, which corresponds to the kingbolt of the cart or wagon. This affords free spring action, and the haulage effort is exerted on the forward ends of the springs. The upper half of the turntable was constructed to be fitted to the wagon, there being a transverse member that carried the stub or stud, the length of which is about five inches.

With this construction the purpose was to raise the forward end of the trailer body on jacks, back the tractor beneath it and lower the body so that the stub of the upper half of the turntable engaged with the opening of the lower half. That there might be no possibility of accident, horses were built the width of the wagon body with a conventional jack at either end, and of height to be placed beneath or drawn from under the trailer body, so that with a pair of short levers the body could be raised or lowered as desired.

The converted wagon body had capacity of 11,000 pounds. Being on large rear wheels, the centre of gravity was high and the load could not be conveniently handled because of the height. The experience with this body was a guide in the construction of the trailer.

Nine-Ton Trailer Built.

The trailer is substantially built of native oak and ironed with hand forged Swedish iron. The body is

16 feet long, has four main sills of that length and two sills 11 feet six inches length. The body is 64 inches wide for four feet six inches, and then widens to seven feet for the remainder of the length, being built narrower at the forward end so as to allow a turning of the tractor to an angle of 90 degrees with the trailer. With the body full width this would not be possible, and short turning radius is extremely desirable with an outfit that is approximately 28 feet long. The body is 30 inches depth. Four heavy truss rods extend the full length of the body beneath it. At the forward end, three large bolsters, bolted to the sills, carry the frame on which is mounted the upper half of the turntable. By raising the forward end of the trailer six inches the turntable is clear of the tractor.

The rear construction of the trailer consists of a pair of 36-inch Archibald wooden wheels with steel tires an inch thick and eight inches width, fitted with plain bearings, that are mounted on a steel axle $3\frac{1}{2}$ inches square. The purpose was to have an axle that would stand extremely hard usage and which would not be susceptible to wear. On this axle are mounted

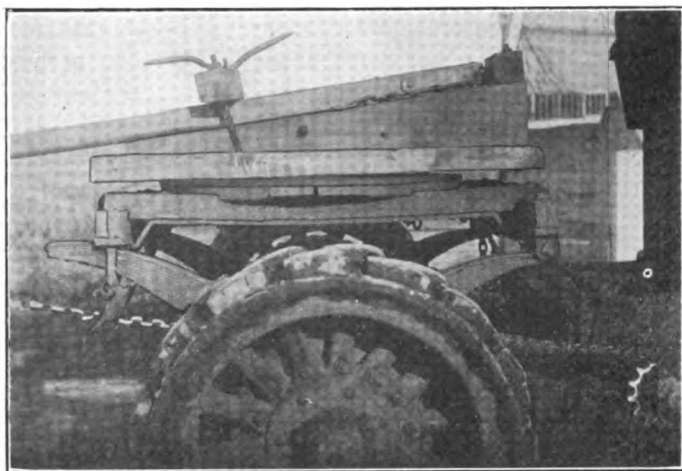


Tractor Coupled to a Train of Three Horse Carts, Simply Adapted at Slight Expense, Used for Hauling Soil for Greenhouses.

two semi-elliptic springs, of deep arc, 58 inches long, $3\frac{1}{2}$ inches wide and with 17 leaves. The springs have a capacity of 15 tons. A heavy oak cross member, stiffened with a half-inch steel plate, is bolted to the six sills, and through this are bolted the brackets for the forward ends of the springs. Four iron braces stiffen the brackets, in which spring eyes are secured by $\frac{3}{4}$ -inch bolts. This gives a light construction and insures the anchorage of the front ends of the springs, which take the haulage stresses. The rear ends of the springs are free in guides bolted to the rear cross member of the frame.

Not Built for Quick Discharging.

The body is fitted with the usual end gate, but at either side, where the body is full width, are two gates that are hinged on rods at the top, and which are held when lowered by ring latches. As the body is not intended to be elevated, this allows unloading from either side or the rear end. The weight is about 1700 pounds. The cost of this body was \$315.54, but this is merely a statement showing expense for stock and



Simple Blocking and Clamps Used for Attaching the Pole of the First Horse Cart of the Train to the Tractor Turntable.

time, and does not include numerous items that would logically be charged were the body built to specifications. In fact, \$500 would be a very low price for the work, and probably \$600 would be nearer what the majority of builders would want for the job. The body is clean built, but appearance was secondary, and it was merely painted "in the lead".

With this trailer the work done has been surprising. The body capacity is approximately nine tons, and Mr. Budlong's comment is that he wishes it was larger. In coal haulage from eight to nine tons is a freight, and the tractor makes from four to five trips, each of approximately nine miles a day. An illustration of a day's work is shown by loads of 16,080, 16,100, 17,110 and 16,780 pounds, this being a total of 66,070 pounds, or an average of 16,517½ pounds to a trip. This is not excessive loading, and no attempt was made to demonstrate capacity, but nine tons could be carried and five trips made a day, bringing the mileage to 45 and the tonnage to 45, and this in about 10 hours.

Big Loads of Vegetables Carried.

The trailer body will carry a single tier of 27 barrels, but for haulage of this kind a rack is bolted to the body in which can be stacked two additional tiers, and above this can be carried a fourth tier, so that 115 barrels can be loaded if the weight is not excessive. With this rack vegetables in bags are carried, and 180 sacks, each weighing 100 pounds, have been hauled frequently. During the period when the firm was shipping onions last autumn the tractor and trailer for a number of days hauled five full loads to the New York steamer pier, this being a total of 50 miles and a tonnage of 45 tons for this day, an equivalent to 225 ton-miles. In the same conditions a two-horse team could carry 80

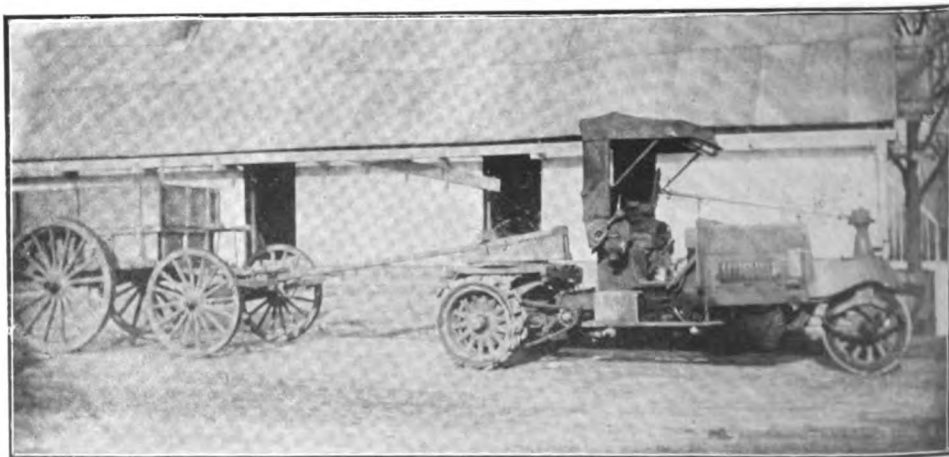
sacks, or four tons, and make two trips a day, this being 20 miles and 40 ton-miles. In this the tractor and trailer did the work of 5 3/5 two-horse carts, and the animals were worked quite up to their capacity.

Used with Horse Carts for Trailers.

When the roses are changed in the greenhouses the old soil must be removed and replaced by new, and on such occasions hundreds of tons of earth must be hauled. This is obtained from a pit two miles distant from the greenhouses. With the round trip of four miles four loads a day is all that can be expected of a team of two horses, a cart and driver. Of course the carts are loaded at the pits by shovellers, and at the greenhouse yard the loads are dumped. But the tractor is used in this work and it will make eight trips a day drawing three two-horse carts, but this is accomplished by making up three trains of three carts each. At the pit two pairs of horses draw the loaded carts from the excavation to the road, because the carts cannot be well handled in the soft earth by the tractor. The pole of the leading cart is coupled to the tractor and the carts are drawn to the greenhouse yard, where they are left convenient for handling, and a single pair of horses draws the carts wherever the loads are wanted, dumps them and returns the carts to the road, where they are coupled. When the tractor has arrived at the pit it leaves a train of three carts, couples on to three loaded carts and returns. This system has three carts at the pit, three on the road and three at the greenhouses, and the tractor is kept at work almost constantly.

In this work the tractor can haul 24 cart loads a day, which is equal to that done by six pairs of horses, six carts and six drivers, but against this must be charged the use of the three pairs of horses for handling the carts in the pits and in the yard, and the three men driving them. The daily mileage is 32. The speed of the tractor could be considerably increased, so that 30 loads or even more might be hauled, but because of the construction of the horse carts they cannot be driven fast and endure in the work.

The coupling of the carts is extremely simple, both to the tractor and to each other, and in practical work,



Tractor and First Cart of Train, Showing the Manner of Controlling the Trailers, Which Are Used Without Attendants.

based on experience extending over more than a year and a half, the carts can be handled satisfactorily. Of course no backing is done and the hauling is over farm roads and city streets, without heavy grades. The carts are not equipped with brakes. But wherever used the train of carts can be hauled as readily as the trailer, so far as control is concerned.

On the turntable of the tractor a timber blocking is placed, as is shown by an illustration, that is clamped rigidly in a longitudinal position, this having a wedge shaped upper section, at the forward end of which is a block. The pole of the leading cart is placed on this with the end against the end block, which serves as a stop. A wooden block, in which are two holes, is placed over two long bolt ends and clamped with short levers threaded at one end for the bolts. When thus clamped the pole is slightly inclined from front to rear and is held so that it cannot move forward or back, the stop at the end of the blocking serving to carry the end thrust when brakes are used on the tractor. The cart is swung in practically the same turning radii as the tractor.

The carts used for trailers are each fitted with two iron guides bolted to the rear members of the cart platform frames large enough to take the ends of cart poles, and in which they can be moved freely. Chains are made fast to rings at the ends of the poles and these are carried through the guides and the pole ends are drawn through the guides. The chains are then carried back to the frames carrying the rear ends of the poles and secured with large claws. The chains secure the poles from moving forward or back, the chains taking the hauling stresses and the poles turning the carts. The carts can be coupled or uncoupled in a very brief time, and a train can be quickly broken in the yard and the cars left where desired.

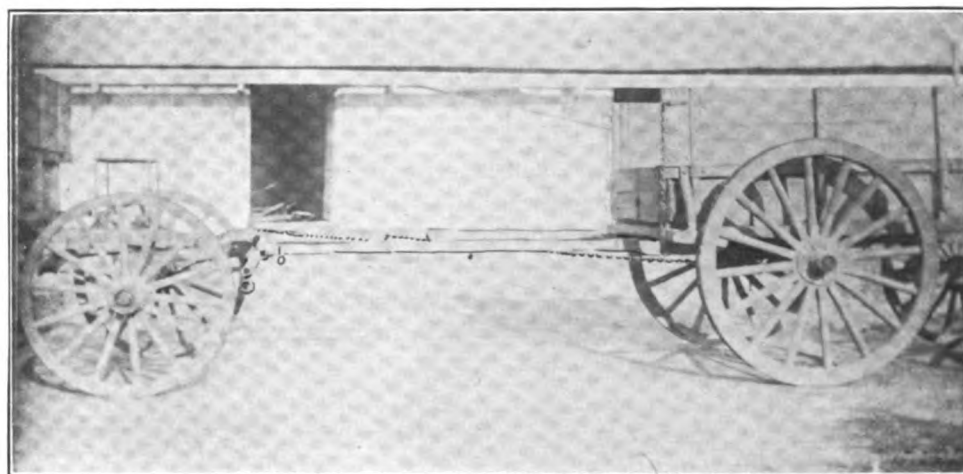
Operating Cost Very Small.

The cost of operating the tractor is surprisingly small. The repair work is done by the local agent for the machine, the driver being expected to make adjustments only and keep it lubricated. The machine was delivered March 5, 1913, and up to Oct. 1, 1914, the cost of repair work was \$721.99, and the original set of tires, which had lasted a year, had been replaced with another set costing \$243.96. The repair cost averaged \$1.50 for 483 working days, and gauging a set of tires by the service of the first set of tires, which cost 79 cents a day for 308 working days, repairs and tires have cost \$2.29 daily. The wages of the driver are \$15 a week. These three items total \$4.79. The cost of oil and fuel is necessarily variable, but generally two quarts of oil is used a day and the average mile-

age with the big trailer is about $7\frac{1}{2}$ to the gallon of gasoline. Using a 40-cent oil, and with gasoline 16 cents a gallon, the fuel and lubricant for a 50-mile day would approximate \$1.28. This would give an actual operating cost of \$6.17. In addition to this must be charged the fixed costs, interest, insurance, taxes, overhead, storage, etc., and depreciation. Mr. Budlong says he figures depreciation at 25 per cent. The cost of the tractor and trailer was approximately \$3500, and allowing 25 per cent. depreciation, \$175 for interest, \$100 for insurance, \$50 for taxes, these amount to about \$4 a day, so that the operating cost is very close to \$10.25 a day, but with the credit of \$2.85 to depreciation earned this makes the actual expense approximately \$7.40 a day. Based on these figures the operating charge of \$10.25 a day ought to cover all normal expenditures and provide a fund at the expiration of four years sufficient to replace the tractor and trailer.

Economy of from 50 to 100 Per Cent.

The figures given are small because of the various economies possible, which might not be so practical



Method of Coupling the Carts of the Train, the Poles Being Placed in Guides Beneath the Cart Frames and Secured by Chains Running Back to the Rear Ends of the Poles.

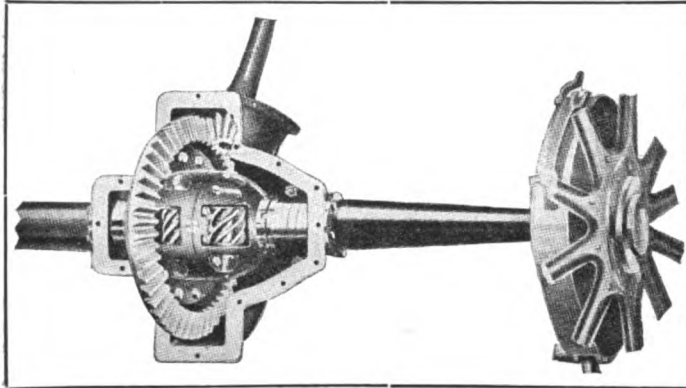
with other concerns, and from 10 to 15 per cent. might be added to bring the operating cost up to what would be regarded as minimum. But the tractor and driver is the equal of four pairs of horses, four carts and four drivers, taking it for averaged work, and charging \$5 a day for a team, cart and driver, which is a very low price, the cost for horse work would be \$20, as against \$10.25 for the tractor and trailer. Mr. Budlong says that the tractor easily shows an economy of 50 per cent. as compared with horses, and in some work will show 100 per cent., and this with a trailer body in which the coal freight must be shovelled. A dumping or quick discharging body would save about a half hour for the machine each trip in the greenhouse yard, or from two to $2\frac{1}{2}$ hours a day when coal is hauled, but it would have very little value for other work. The coal is loaded by gravity at the pier.

Because of the changed conditions of the business the company has reduced its horses until now but 52 are in use, and Mr. Budlong says that he does not in-

tend to buy others for any other service than farm work, plowing, etc., for he has found the economy of machines for haulage is unquestioned. The company now has two three-ton trucks and the tractor, and these are equal to at least 20 horses, to say nothing of the reserve, and the fact that when the machines are not in service all expense save the fixed charges (but not including the depreciation) ceases.

THE NEW M. & S. DIFFERENTIAL.

The M. & S. Gear Company, Kansas City, Mo., announces a new differential adapted for both pleasure



The New M. & S. Spiral Gear Differential.

and commercial cars, which is a considerable departure from the usual types, and is said to possess many advantages. The announcement includes the further interesting information that manufacturers will be supplied exclusively by the Brown-Lipe-Chapin Company, Syracuse, N. Y., replacements being handled by the M. & S. Gear Company direct.

The differential, which is shown in section herewith, embodies four helical gears, E, E2, E3 and E5, mounted perpendicular to the axle and engaging gears A and B, which are splined to the axle, and float with it in the differential housing, and engaging also gears E1 and E4, which are journaled to two arms of a spider. All except A and B are exactly alike, cut at 45 degrees, and journaled in the housing, each at right angles to the gears with which it is engaged, the teeth being always in mesh. When power is applied to the driving gear C, the rear axle is thereby rotated, but the differential gears do not turn on their own axes, and this is stated to be the case even when there is a difference in the traction of the two wheels, the power being transmitted to that having the greatest traction, and both sides of the axle rotating at the same speed. This avoids slippage when one wheel is on a wet or oily surface for, so long as the direction of the car is straight ahead, both rear wheels will travel the same distance. When, however, a turn is made, and the distance to be travelled by one wheel is greater than that of the other, the six gears rotate independently through their spiral engagement with each other and with the gears A and B, permitting such difference in speeds of the two sides of the rear

axle as will permit the wheels to travel their different distances in the same time. The operation may be summarized by saying that there is no differential effect from the point of the application of power, but it can only be brought into action by differences in the travel of the wheels.

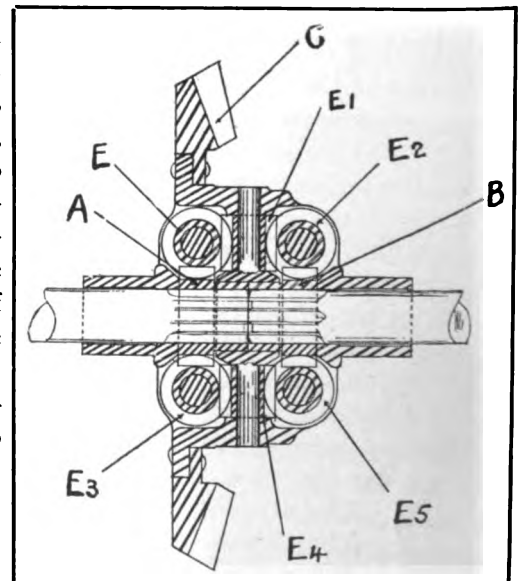
Several advantages are claimed, aside from the avoidance of slippage already referred to. The driving pressure is equal so long as the direction is straight ahead, but on turns is proportionate to the distances which the wheels must travel, and a lever action also is stated to exist between the two sides of the drive, this equalization of power lessening the driving strain, reducing the wear on the tires and minimizing the danger of skidding. Particularly in the case of commercial vehicles are all the features, to which attention has been called, of importance, as an inconvenience which may be unimportant in the operation of the pleasure car is highly magnified in the heavily loaded truck.

Some deliveries of the new differential are stated to have been made, notably one order to a manufacturer for the equipment of a large shipment of trucks for Europe, and other concerns are trying out samples. As rapidly as possible, sizes and types adapted for all standard cars will be brought out, the first of which, it is announced, will be designed for the Ford car.

VICTOR STORAGE BATTERY COMPANY.

The Victor Storage Battery Company, Moline, Ill., has been formed to manufacture storage batteries for motor starting and lighting. The capitalization of the new company is \$100,000. At a later date it is proposed to manufacture batteries for electric vehicles.

At a meeting of the stockholders, G. E. Brown of Galena was elected president, George White vice president, B. F. White secretary and T. D. White treasurer. With the exception of President Brown all of the officers reside in Moline. E. E. Winters of Chicago, Ill., who has invented a battery, the plates of which he says will not sulphate, is to be the superintendent of the new company.



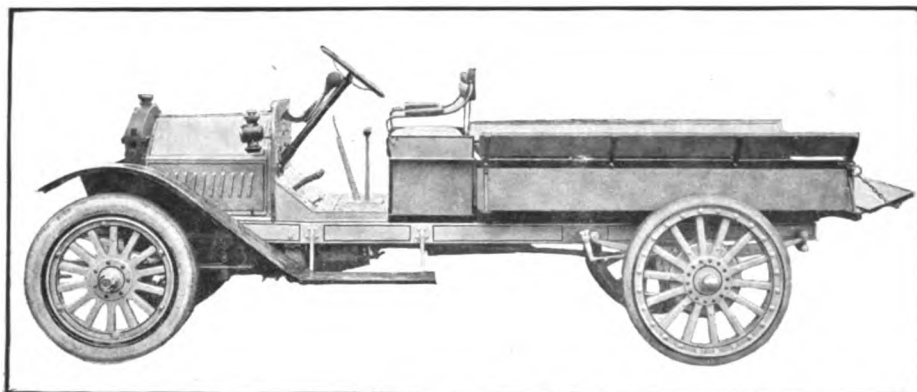
Sectional View of the M. & S. Differential.

FEATURES OF SANFORD 1500-POUND MODEL.

THE new 1500-pound model Sanford truck, which has just been brought out by the Sanford Motor Truck Company, Syracuse, N. Y., differs in num-

and the clutch is provided with a brake to facilitate gear shifting. A three-bearing crank is used, running in an oil tight aluminum crank case.

From the gearset the power is transmitted to the Torbensen internal gear driven rear axle, through a shaft with two universals, and is applied to the floating members attached to the rear wheels, the load being carried on a dead axle. The power plant lubrication is automatic constant level splash, with a gear driven pump, and a sight feed placed on the dash. The Rome-Turney radiator with belt driven fan is used, and is flexibly mounted.



The 1500-Pound Sanford Truck Equipped with Express Body.

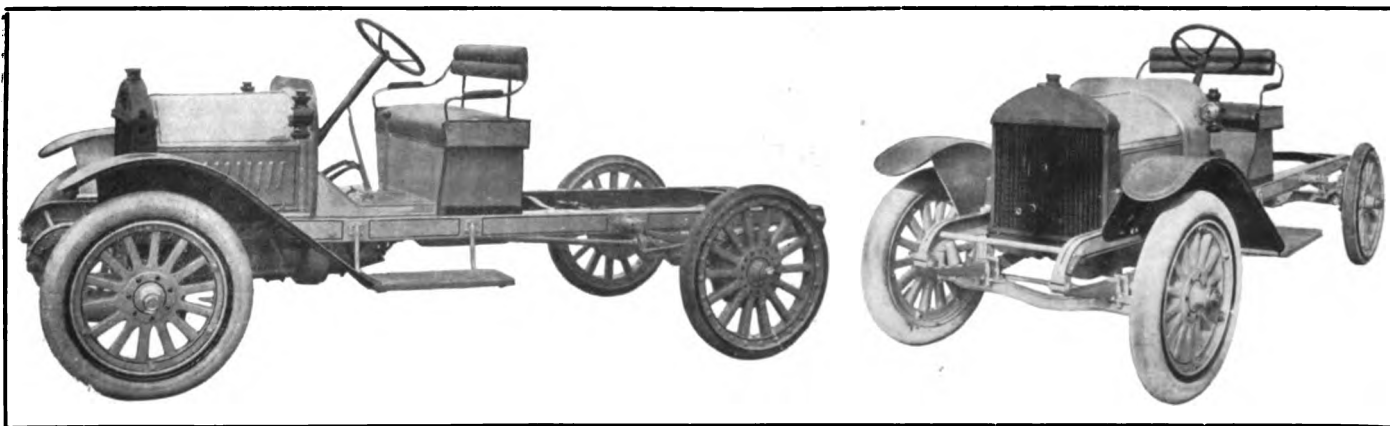
erous particulars from the earlier productions of this company, and presents many features of interest.

Built in two sizes, of one-ton and 1½-ton capacity, and, therefore, designed for the transportation of the lighter forms of merchandise, much attention has been given to ease and rapidity of handling, and the consequent economy of the time of the operator. Nothing of strength or stability has been sacrificed, however, and the specifications indicate a vehicle which will not only lend itself to rapid work, but will also give long and satisfactory service. The pressed steel frame is of channel section, 3/16-inch by 4½ inches deep, with a four-inch top flange running nearly the full length, and is inswept 2¼ inches in front for easy turning.

The unit power plant is located under the hood instead of under the floor of the car, as formerly, and consists of a four-cylinder Buda truck type motor, 3½-inch bore and 5⅞-inch stroke, developing 25 horsepower at 1500 revolutions a minute; a Brown-Lipe multiple dry plate clutch, and Brown-Lipe selective sliding gear transmission. The ignition is the Splitdorf fixed spark, the motor control being by foot accelerator only, leaving the hands of the operator free. Three speeds forward and one reverse are given,

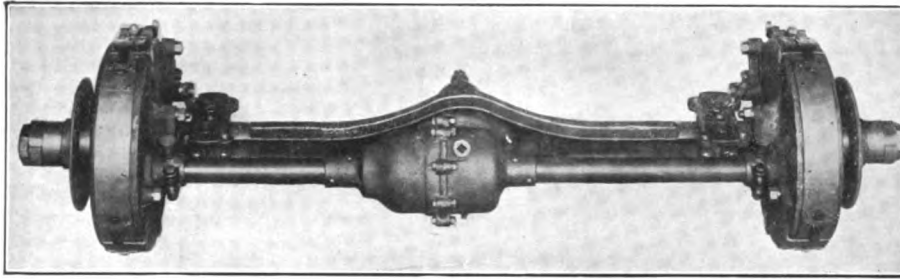
A Ross steering gear, left hand screw and nut type, with large hand wheel, is located on the left, and the brake and gearshift levers are placed in the centre. Both the foot and hand brakes operate on drums on the rear wheels. The spring system consists of two-inch semi-elliptic front springs, 38 inches long and 2½ by 45-inch platform springs at the rear, the latter taking both torque and drive.

The dimensions are as follows: Wheelbase, 120 inches; overall length, 122 inches; loading platform, seven feet by 34 inches, overhanging the rear axle 30 inches and 28 inches from the ground when the truck is loaded and 30 inches when empty; tread, 56 inches, both front and rear. The three forward speeds when the truck is empty are six, 12 and 20 miles an hour, and the normal speed, when loaded, is 15 miles, with a maximum of 18 miles with a full load. Solid tires, 36 by three-inch front and 36 by 3½-inch rear, are standard equipment, but when speed is required, 34 by 4½-inch pneumatics will be fitted in front. Square spoke artillery type wheels, having large hubs and demountable rims, are used, running on taper roller bearings, both wheels and bearings being of ample strength. The distribution of the load is 60 per cent. on the rear wheels when loaded, and 40 per cent. when empty.



The New 1500-Pound Model Chassis, on Which Any Suitable Type of Body May Be Mounted.

The gasoline tank, holding 15 gallons, is located under the driver's seat. Taper roller bearings are used throughout, except in the clutch and transmission, in which annular bearings are employed.



The Rear Axle Assembly of the New Sanford Truck.

It will be observed that the parts are of standard make and that all the details of the design are in accord with approved practise. The requirements of the motor truck are so varied and trying that a broad margin of safety is of the highest importance, and this fact has not been lost sight of by the builder of the Sanford line. On the other hand, the lighter commercial vehicles require, for their efficient use, a considerable flexibility and the utmost convenience and ease of operation.

Because the truck is employed for the transportation of merchandise rather than passengers, it has not been thought necessary, in the past, to equip it with those aids to its operation which are demanded in the pleasure car, the fact being lost sight of that every facility provided the operator means greater efficiency in the use of the truck itself. With the growing realization of the possibilities of commercial motor vehicles, however, has come a demand for cars suitable for rapid, as well as heavy hauling. The Sanford truck is well adapted to these conditions and should have a wide range of usefulness.

Aside from its ease of operation, its compact design makes it particularly suited for use in congested sections where a more bulky vehicle would be out of the question. Having a small turning radius, it can be turned in a 28-foot circle. It may be loaded and unloaded in very narrow areas without the necessity of backing in or out, and handled in railroad yards and similar restricted spaces without difficulty.

The express body, shown in the illustration, is standard, but the chassis may be equipped with other types if required by the user.

The materials and construction are of the best throughout, assuring long service, with the minimum of repairs, and this reliability, together with the facility of operation, should result in the greatest economy in any sort of commercial employment.

INCORPORATE ZOLINE COMPANY.

The Zoline Company, Indianapolis, Ind., has been incorporated to manufacture Zoline, a substitute fuel for gasoline. The company is capitalized for \$100,000. The fuel, which has been tested on the Indianapolis speedway, is the invention of John Andrus of McKeesport, Penn. It was tried out in a 1000-mile run by a Marmon six.

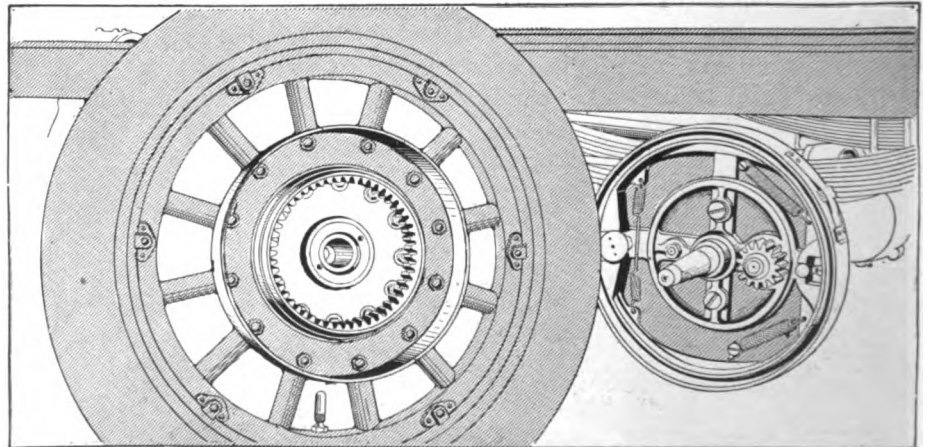
It is stated that, with the exception of 10 shares, all of the capital stock will be issued to Mr. Andrus, Carl G. Fisher and Dr. W. H. Chambers, the latter of McKeesport, in consideration of an assignment by them to the corporation of all their respective rights under a contract entered into by and between Messrs. Andrus and Fisher.

Others interested in the Zoline Company include James A. Allison, Ernest W. Bradford and Howard C. Marmon, Indianapolis, and Henry B. Joy, Detroit.

POSTING SIGNS IN NEW MEXICO.

The sign posting truck, sent out by the Automobile Club of southern California, has completed the marking of an official route from Albuquerque, N. M., to Los Angeles, Cal., having placed steel guide posts at short intervals over the entire distance. The work is financed by the counties through which the routes pass, and this plan will be pursued as far as it is found possible to make such arrangements with the local authorities, it being hoped to carry it through Colorado and Kansas, at least.

Frederick H. Cozzens, formerly with the International Motors Company, New York City, has been appointed eastern sales manager for the Four-Wheel



The Torbenston Internal Gear Drive, Used on the New Sanford Truck.

Drive Auto Company, Clintonville, Wis. He will have charge of all the territory lying east and north of a line drawn from Erie, Penn., through Pittsburg, Penn., and Wilmington, N. C.

MANY OPPOSE MOTOR TRUCK TAX.

The plan of the Providence, R. I., ordinance committee for the increase of motor truck registration was strongly opposed by the Motor Truck Owners' Association and others at a recent meeting. It was the contention of the association officers that the trucks did but slight damage to the city's streets, and it was asserted that, to increase the registration figure with this as a reason, would be discriminatory and unfair.

The placing of a registration fee upon horse drawn vehicles, which now are in most cases untaxed, was one substitute plan advanced by the truck owners, while a second, which met with practically unanimous approval, was that a law should be passed limiting the speed of motor trucks to eight or nine miles an hour. It was the contention of all concerned that but slight damage was done to the streets when the machines were running slowly.

It was the opinion of J. D. Turner, president of the Motor Truck Owners' Association, that most of the damage was done to the streets by horses. The calks of the horses' shoes, he said, cut small holes in the street surfaces. These, in time, grow larger and result in dissolution of the surface. Councilman Bixby asked Mr. Turner if it was not true that in hot weather, when asphalt softens, heavy motor trucks passing over it roll it until it becomes wavy. Mr. Turner said that this might be the case, but added that if it were, the fault was in the street, which should have a heavier binder.

"MADE IN U. S. A." TRADE MARK.

With a view to giving a definite impetus to the "Made in the U. S. A." movement, which has started sporadically in various parts of the United States, the Detroit board of commerce offers a \$500 prize for the best "Made in Detroit, U. S. A." trade mark submitted by an American designer.

However, this is not a local affair. The rules of the contest state specifically that the trade mark must be national in character, and that space must be provided for the name of any city. The contest closes Feb. 25, 1915.

DELIVER APPLES BY TRUCKS.

The delivery of 30,000 apples over a territory 12 miles long and eight miles wide, made by eight cars in three hours, at Portland, Ore., on Apple day, is a striking example of the efficiency of modern delivery service.

OVERLANDS IN LONDON.

After an exhaustive test of all available cars, English and American, Harrods, Ltd., the famous department store of London, England, recently purchased 12 Overland delivery wagons for its delivery service,

which the war threatened to entirely disorganize. A subsequent order for nine more similar cars indicates that the first purchase proved highly satisfactory. The fleet is in service not only for ordinary delivery, but also in the transportation of provisions to the 22,000 Canadian troops encamped on Salisbury plains, several miles from London.

DEALER'S ASSOCIATION IN SAVANNAH.

The dealers and garage men of Savannah, Ga., have organized under the name, Savannah Automobile Service Association, with the object of improving trade conditions and promoting better service to the public.

REFRIGERATOR ON WHEELS.

An electric motor truck that resembles a huge refrigerator has been built for a Porto Rico ice dealer to enable him to deliver his congealed wares with a minimum of loss by melting.

RUSSIA PLANNING SYNDICATE.

Representatives of the Russian government are in New York City arranging to form a syndicate to guarantee the payment of war supplies on a six months basis.

ELECTRICS TO CROSS CONTINENT.

A transcontinental run over the Lincoln highway next summer is being planned by the Electric Vehicle Association, for both pleasure and commercial electric vehicles.

BRANCH IN KANSAS CITY.

The Firestone Tire & Rubber Company, Akron, O., has established a branch in Kansas City, Kan. Heretofore the business in the states of Kansas and Oklahoma has been carried on from the St. Louis branch.

CENTRAL DEPOT IN SOUTH AMERICA.

An association has been formed in Chicago for the purpose of establishing a large central automobile depot in South America, with branch depots at most of the principal ports.

The Peerless Motor Car Company, Cleveland, O., has discontinued its Boston, Mass., office as a factory branch. The Beacon Motor Car Company has been organized to handle the Peerless line in that city.

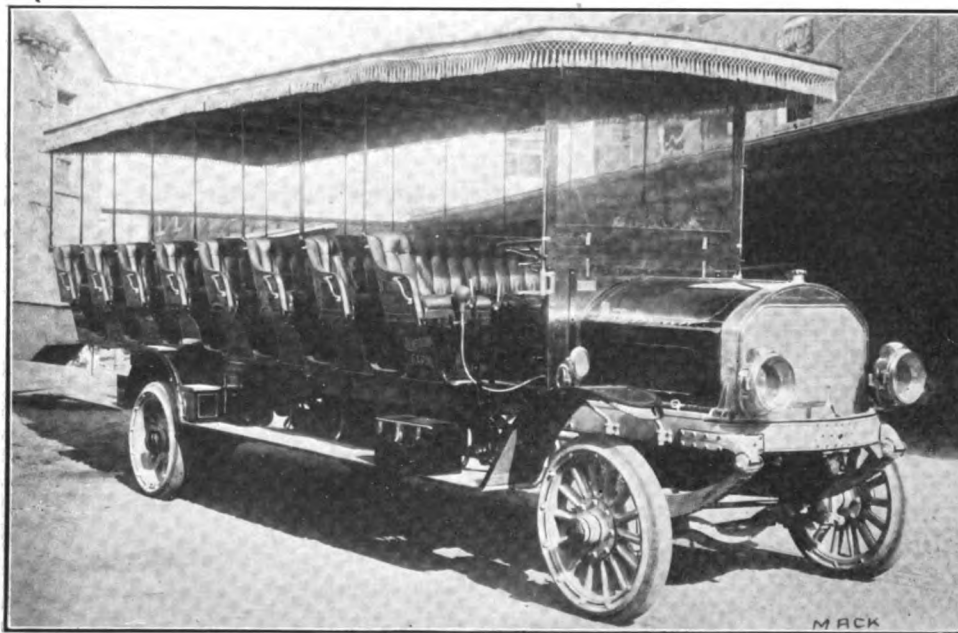
The Newark Motor 'Bus Company, Newark, N. J., hopes to obtain a franchise for the operation of 'buses in that city. The company has offered to pay the municipality five per cent. of its gross receipts.

RECORD FOR WHITE TRUCK "A."

Active service for $4\frac{1}{2}$ years, during which time approximately 200,000 miles have been covered, is the record of a White truck in the possession of the W. P. Southworth Company, Cleveland, O. This truck, which is known on the books of the White Company, Cleveland, O., as truck "A", is stated to be as serviceable today as it was when purchased in May, 1910. The Southworth fleet now consists of one $\frac{3}{4}$ -ton White, seven $1\frac{1}{2}$ -ton Whites and one five-ton White.

MACK TRUCK CARRIES FARM EMPLOYEES.

The 40-passenger sight seeing car, illustrated herewith, is used to transport workmen residing in Lexington, Ky., to and from Elmendorf farm, the estate of James B. Haggin, near that city. A large number of employees are engaged on the estate and two of these



One of Two 40-Passenger Cars on Mack Chassis, and Used at Elmendorf Farm, Near Lexington, Ky.

40-passenger cars are used for their accommodation. The sight seeing bodies are built on Mack trucks, manufactured by the International Motor Company, West End avenue and 64th street, New York City, five of which are in use on the Haggin estate. The utility of the commercial vehicle for passenger transportation in localities remote from street car service, as exemplified in this instance, is rapidly increasing, and indicates a field well worth development by the truck manufacturer.

SEEK TRUCK LINE FOR RUSSIA.

Robert Pluym of Pluym-Ochs, Ltd., Kazanskaya Ploschad 3, Petrograd, is in New York City seeking some American motor truck concern which will establish and operate a line of motor trucks between Khiva and the Caspian sea. This route traverses

some 400 miles of desert and at the present time it is necessary to bring the cotton to the manufacturing centres by a round about route which takes two weeks.

It is figured that with motor trucks it would be possible to rush the goods across the desert in 48 hours, running day and night. The desert surface is said to be quite firm. The total investment required would approximate \$250,000.

MOTOR TRUCK INSURANCE HIGH.

The Motor Truck Club of America, New York City, at its recent meeting, appointed a special committee to investigate the conditions of motor truck insurance. Believing the persistent increase in insurance rates on commercial motor vehicles can be offset by co-operative action in several directions, this committee was empowered to take aggressive steps. The purpose of this concerted movement is not alone to secure better rates on insurance, but to study and correct many things, such as the so-called moral hazard, which have influenced the insurance companies to raise the rates.

The members of this special committee are Roderick Stevens of the Olin J. Stevens Coal Company; H. P. Caverly, National Lead Company; George H. Pride, Heavy Haulage Company; W. Oscar Shadbolt, body builder, and W. I. Payne, of Payne & Ramsey, Inc., insurance brokers.

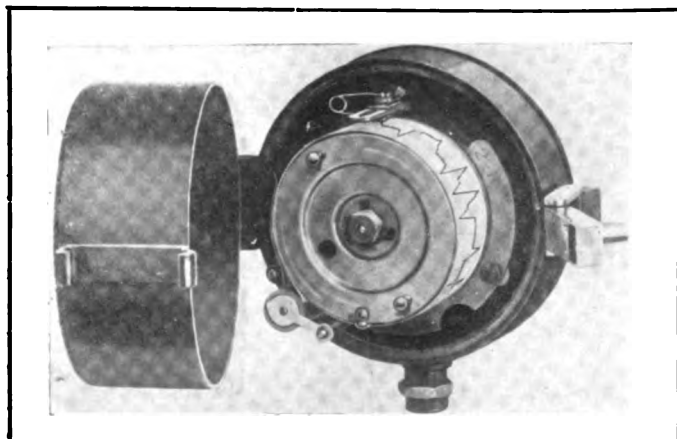
In discussing the plans of the committee, Mr. Payne said that, owing to the fact that there has been a steady increase in the insurance rates covering motor vehicles, which has made it a hardship for the users of the said vehicles to meet this increase in the premium, the club deemed it advisable to appoint an insurance committee. This committee, says Mr. Payne, will investigate the reason for the increases and, if possible, determine what has brought them about.

NEW SPARK PLUG IS NAMED.

From the 3800 names submitted for the new spark plug brought out by Emil Grossman Manufacturing Company, New York City, that sent in by R. F. Darby, 30 Church street, New York City, who suggested "Onepiece", was selected, as most accurately describing the construction.

A NEW HUB ODOMETER.

The exhibit of the American Taximeter Company, New York City, at both the Chicago and New York



Recordograph, which records Time, Distance, Speed and Stops.

shows, will present a new hub odometer called the "Transimeter". The device, which records accurately all the mileage of the vehicle, is made in four types, of which one, the "Dreadnought", is guaranteed indestructible, and another, the "Applied", will fit any vehicle. The mechanism is contained in a strong steel casting, and is fully protected from dirt and damage. It replaces the hub cap entirely, and is dust and grease proof. The mileage record is contained under a glass covering in the centre of the hub, and does not rotate, so that it is never inverted, and may be read without danger of error. Another interesting instrument is the Recordograph, which employs a paper tape on which are recorded the time, distance, speed and stops, showing every movement of the vehicle and enabling the owner to make an accurate check of its use. The operation of the Recordograph is by a slow moving, flexible transmission shaft, from a mechanism of the star type on the front wheel, and on account of its special method of attachment it cannot be tampered with. By reason of the information which it supplies, the vehicle can be operated with greater efficiency and, in case of alleged speeding, it furnishes an indisputable record of the speed at any given time, and is held to be invaluable in court proceedings of this kind.

The line of taximeters to be displayed includes the Jones, an American instrument, which will be shown in its latest improved type, and the Popp, a French machine. The former, which makes its sixth appearance, gives accurately the fare at any predetermined rate, and is absolutely guaranteed against any form of tampering. The Popp is exhibited for the seventh time, being the first taximeter to be used commercially in this country. It is supplied to register the fare in either of two tariffs, and is exceedingly simple in operation. The exact fare is shown the passenger on the face of the instrument, and a record of the entire operation of the vehicle is given the owner on the back. The headquarters of the American Taximeter Company are at 735 Seventh avenue, New York City,

and branches are operated in principal cities. Complete details will be supplied upon request.

ELECTRIC PATROL FOR BOSTON.

For use in the centre of the city, where traffic is greatly congested and frequent stops must be made, the police department of Boston, Mass., has ordered a 1915 General Vehicle electric worm drive patrol wagon. The selection of this type of vehicle was made largely on account of its ease of operation under all conditions, and the fact that even an officer without previous experience could operate it in an emergency. The number of General Vehicle electrics in Boston is rapidly increasing, 15 having been recently sold to the Loose-Wiles Biscuit Company, who already had 12 in service, and numerous other sales to large users being reported within the last few weeks.

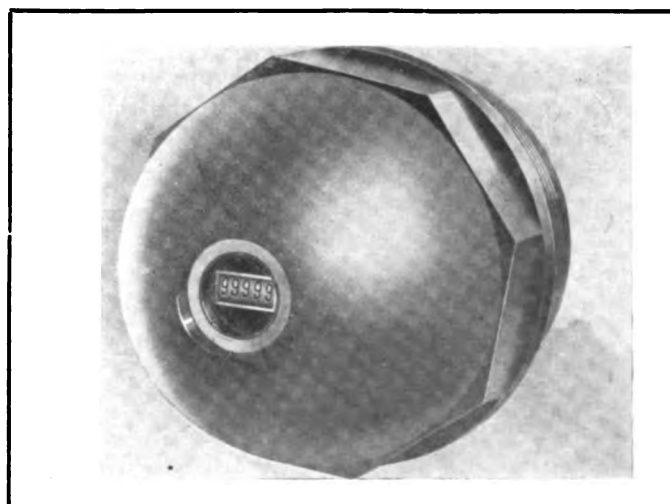
WILLIAM MURRAY DEAD.

William Murray, the oldest member of the board of directors of the Joseph Dixon Crucible Company, Jersey City, N. J., is dead at Larchmont, N. Y. Mr. Murray was the senior director both in point of years and service. He was also a director in many other corporations, a member of leading clubs and one of the most prominent yachtsmen of the northern shore of Long Island sound.

RECORD FOR GOODRICH TIRES.

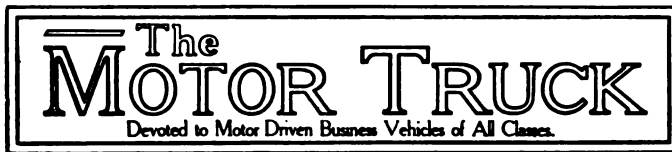
The Union Transfer Company, operating a baggage transfer service in Philadelphia, Baltimore and Washington, reports a remarkable record of service given by Goodrich wireless motor truck tires, on one of its trucks in Washington.

The truck hauled its first load of baggage in June,



The Indestructible Dreadnought Type of the Transimeter.

1911, and in January, 1913, the first replacement was necessary, when one rear tire was changed after it had run 12,900 miles. The following April the other rear tire was taken off with 17,000 miles to its credit.



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ADVERTISING RATES.

Information given on request. All advertising copy must reach this office not later than the 25th of the month preceding.

Anonymous communications not considered. Correspondence on subjects relating to trucks, delivery wagons, taxicabs, tractors, all motor driven farm, fire and municipal apparatus, the motor industry and the trade, will receive attention. Stamps must be enclosed to insure return of unsolicited contributions.

Entered as second class matter, February 25, 1911, at the Post-office at Pawtucket, R. I., under the Act of March 3rd, 1879.

STREET TRAFFIC REGULATION.

One of the greatest obstacles to the economic use of motor vehicles is the traffic in the streets of many of the commercial centres. The efficiency of quick loading facilities is lessened if the machines are delayed. If the conditions for unloading are unfavorable, additional time is lost, and the only other factor that can be controlled is vehicle speed. This, however, is dependent upon traffic, and so there is every reason why municipalities should systematically regulate the use of highways, that wagons and trucks can move up to such limitations of speed as shall be approved. The streets ought to be kept as clear as is practical, loading and unloading places and time specified, and relaying of vehicles insisted upon, so that there shall be minimum numbers in any one location save, perhaps, when the first loads are being made up. Night haulage is just being considered in some of the large cities, but there is no doubt that this will eventually be resorted to as a means of affording relief.

COST OF HAULAGE ANIMALS.

Highway freight vehicles are generally drawn by horses and mules. A carefully prepared estimate by the national government of the number of these animals in the United States is approximately 24,000,000. The value of these at \$125 each would be \$3,000,000,000, an extremely low estimate, but the total is the more significant when one understands that the highest valuation of property of all kinds in the United

States in 1911 was \$130,000,000,000. Horses and mules have practically doubled in price during the last generation. Horse food has increased enormously during the same period. Every item of animal maintenance and operating cost has kept pace, but the work animals can do is no more. In fact, restriction of hours of labor of the driver, and street and terminal congestion have all tended to reduce the productiveness of horse vehicles. And highway transportation, based on horse cost, has become more costly. The demand for horses for use in the European war, although but a comparatively small percentage of the total owned in America, has caused prices for them to advance from 10 to 15 per cent., and the end is not yet. And the same cause is also influencing the other items of horse maintenance. Next season ought to be extremely profitable for motor truck manufacturers, if economy is a material purchasing factor.

GOOD LIGHTS FOR MOTOR TRUCKS.

Few manufacturers, and seemingly still fewer owners, apparently realize the necessity of good lamp equipment on motor trucks and wagons. This does not mean ornamental lamps, but what will endure the extreme vibration resulting from use on rough streets and roads with and without loads. When machines are used during hours of darkness, and many are so used for considerable portions of the year, the small oil dash lamps merely serve to define for others the position of the vehicles in the highway and are practically useless for lighting the road surfaces. For this reason obstacles that might well be avoided are met with and the machines deteriorate much more rapidly than there is need of. This statement particularly applies to vehicles used in suburbs and rural sections. Lamps of the types used for pleasure cars are unserviceable because of the vibratory stresses, and equipment must be designed that will endure. There are comparatively few lamps to be found that can be adapted, and gas is the logical fuel. There is an excellent opportunity for a lamp manufacturer to exploit equipment that will meet the stated need.

SPEED OF MOTOR TRUCKS.

Fast driving, especially without load, causes extreme vibratory stresses to trucks, against which there is no protection. Engine governing merely establishes a limit to speed, but it does not insure against destructive operation. The owner always sanctions overloading because he believes he is getting something for nothing, and he imagines that driving to maximum is saving him time, no matter what the conditions. Sane operating means keeping the truck moving as much of the time as is possible, economizing time for loading and unloading, avoiding rough streets or roads, and crossing all depressions or obstacles without extreme spring stresses.

STREET CLEANING DEVICES IN NEW YORK.

At the recent show of the New York City street cleaning department, held at the 22nd Armory, there were 16 motor trucks exhibited, 13 equipped with different types of street cleaning appurtenances, and three chassis without bodies.

Eleven different makes were represented, as follows: General Vehicle, four machines; Lansden electrics, two; Jeffery, one standard 1½-ton and one four-wheel drive model. All the others had one truck each, including Reo, Packard, White, Garford, C. T., Ward, Knox and Couple-Gear.

WAVERLEY ELECTRIC FOR GOVERNMENT.

The Waverley Company, Indianapolis, Ind., has under construction for the navy yard on Puget sound, Washington, a three-ton electric shop truck with a three-ton trailer for hauling plates and angles from storage to machines and from machine to machine, through the naval repair shop. The tractor is of unusual design in that with a wheelbase of 66 inches the platform of the car is five feet by 11 feet. The principal overhang is in front of the front axle.

The battery of 42 cells is divided between two battery boxes, one between the wheels and the other under the forward underhang. Mounted on the platform of each car is a turntable five feet two inches in diameter, running on rollers and operated by hand spikes, for the quick and convenient unloading of the heavy plates or beams which it is designed to carry in the navy yard work.

A mileage of 30 miles on a single charge of the battery is provided and a speed of 5½ miles an hour with both cars fully loaded. With suitable floors and pavements, electric shop trucks and trailers should have a large field of usefulness in many factories.

NEW CHICAGO MANAGER.

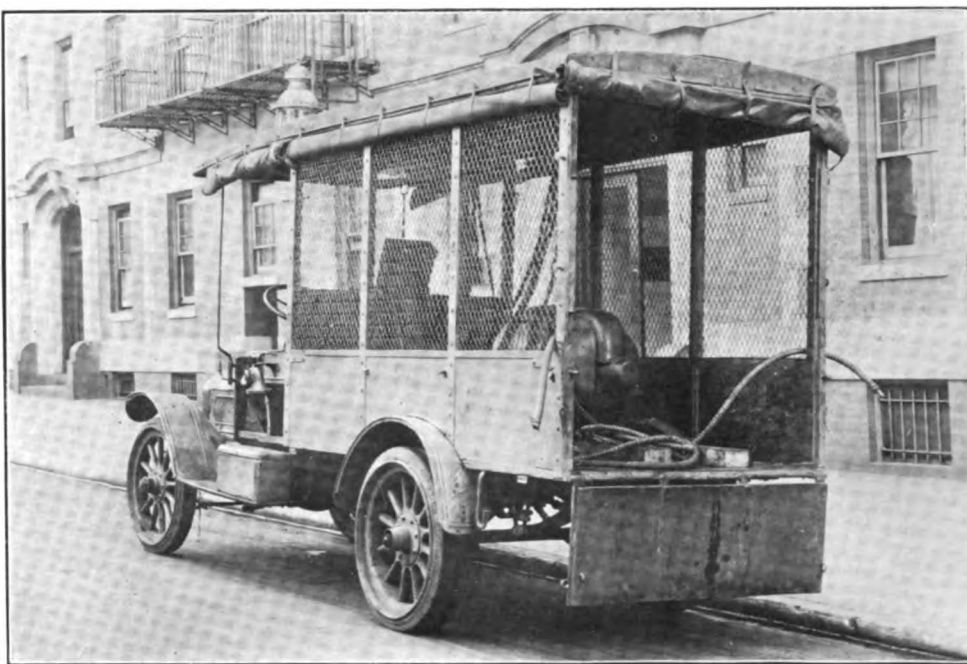
The Edison Storage Battery Company, Orange, N. J., has appointed William F. Bauer manager of its Chicago, Ill., office, in place of Charles B. Frayer, who retired Nov. 30, to engage in private business. Mr. Bauer has been long connected with the electrical industry in Chicago and elsewhere, and has been with the Edison Company, as assistant manager of the railway department. He is president of the Railway Electrical Supply Manufacturers' Association.

PORTABLE GENERATING PLANT.**Mack Two-Ton Truck Equipped with Dynamo for Foreign Service.**

A. F. Masury, chief engineer of the International Motor Company, New York City, has adapted a generating set to Mack trucks, the equipment being arranged for army service. Portable electric plants are generally employed in the conflict abroad, being utilized to supply current for operating searchlights, energizing wire fences and other metal entanglements placed in front of trenches, fortifications, etc.

One of the advantages of the truck equipped with a generating equipment is that it can be moved as desired from place to place, and the same engine utilized for operating the dynamo.

The Mack two-ton vehicle shown in the accom-



Mack Two-Ton Truck Equipped with Generating Set, Providing a Portable Electric Plant Designed for Army Service.

panying illustration, has space for carrying cable, electric connections, field equipment, etc., and is a complete unit in itself, one not dependent on any base. The generator is a special 10½-kilowatt General Electric, self-exciting, single-phase, 60-cycle, weighing 1300 pounds and supplying 600 volts. The rheostat is mounted conveniently, and a clutch is provided for connecting the generator with the driving member. The equipment also includes a reel and wire support, and space is provided for a field emergency outfit.

The generating equipment utilized with the five-ton Mack truck has practically similar equipment with the exception of the generator, which is 17½ kilowatts, supplying 600 volts.

The White Company, Cleveland, O., was awarded the contract for a new automobile to be purchased by the police department of Ansonia, Conn.

SIX CENTS A GALLON.

Moreland Truck Operated 1274 Miles on 105 Gallons of Distillate.

A vacation trip, which was also an official fuel and efficiency test, has just been completed by employees of the Moreland Motor Truck Company, Los Angeles, Cal., manufacturer of the Moreland distillate truck. The run covered 1274 miles in California, among the mountains of the Yosemite region, and through the Mojave desert. Notwithstanding the car was loaded to capacity, it is stated that not a tool was touched, nor an adjustment made during the entire trip. The record, which is official, and was supervised by local newspaper men, shows that 105 gallons of distillate, costing six cents a gallon, were used, at



The Moreland Distillate Motor Truck, Which Made a Remarkable Record in a 1274-Mile Trip in California.

an average mileage of 12.1 a gallon, and a cost of less than half a cent a mile.

The $\frac{3}{4}$ -ton truck which was used has a four-cylinder, water cooled motor, with a $3\frac{3}{4}$ -inch bore and $5\frac{1}{4}$ -inch stroke, and is fitted with the Moreland Gasifier, the carburetor being adjusted for gasoline and distillate. It is of the unit power plant type, and is rated at 25 horsepower. The clutch is multiple-disc, asbestos to steel, the drive is by shaft to the full floating rear axle, and the transmission is sliding gear selective with three speeds forward and one reverse. A Westinghouse combination ignition and lighting system is used, and the lubrication is by double force feed with constant oil level. The frame is special alloy pressed steel, $4\frac{1}{2}$ inches deep, $1\frac{1}{2}$ wide and $3/16$ cross section. Timken axles and roller bearings are used, both front and rear, and wheels are of second-growth hickory, with demountable rims, and 34 by $3\frac{1}{2}$ -inch

tires all around. The wheelbase is 126 inches and the tread 56 inches.

It is stated that the motor operates perfectly on No. 1 engine distillate of about 48 degrees, selling in Los Angeles at $5\frac{1}{2}$ cents a gallon, this being made possible by the Moreland Gasifier. Distillate, as is generally known, is produced from petroleum having an asphalt instead of a paraffin base, and as this is the character of most of the California oils, as well as those of Texas and contiguous localities, its practical use should be productive of great economy. It is stated by the manufacturer, moreover, that the Moreland truck will operate on other low-grade oils with satisfactory results.

BOSTON ELECTRIC TRUCKS INCREASE.

Electric trucks in Boston, Mass., are increasing steadily. The Loose-Wiles Biscuit Company has ordered 15 more General Vehicle electric trucks, giving it a fleet of 27 General Vehicle electrics. The Stickney & Poor Company has just received a two-ton General Vehicle electric, which will be used for hauling mustard and spices from its factory to merchants and the various freight houses.

The Boston Woven Hose and Rubber Company, Cambridge, Mass., is starting its second one-man General Vehicle electric. These two machines are used entirely on short hauls around the plant of this company. They have proved money earners on short haul work. A worm driven General Vehicle electric has been added to station 4 of the Boston police department.

This machine will be used in the centre of the city for regular patrol and ambulance work. It was selected on account of the numerous starts and stops necessary, and the facility of operating this type of vehicle through congested streets. Its ease of operation also makes it possible to utilize as driver practically any police officer on duty should an emergency arise.

The Willys-Overland Company, Toledo, O., will shortly add 50 men to the force at the old Grammm plant in Lima, O. The company will now manufacture 1500-pound trucks exclusively at this plant.

The Sheldon Axle Company, Wilkes-Barre, Penn., has changed its name to the Sheldon Axle and Spring Company. The new style links the name of both the products made by the company.

S. A. E. ANNUAL MEETING JANUARY 5-7.

THE annual meeting of the Society of American Engineers will be held at the society headquarters, 1790 Broadway, and at the Engineering Societies' building, New York City, Jan. 5-7. The full tentative programme of the meeting is printed herewith. On Tuesday, Jan. 5, a meeting of the standards committee will be held at 9 a. m., at which time all members are welcome.

At the recent meeting of the standards committee reports were submitted by 12 divisions of the committee at its three afternoon sessions. As was expected, the reports consisted largely of statements of the manner in which the various subjects under consideration are being approached and the results of the sub-committee's deliberations to date.

The commercial car wheels division recommended

the present standard the thickness of the felloe band is $\frac{3}{8}$ -inch for all sizes of dual tires.

The electric vehicle division sub-committees on motors, controllers, batteries, wiring and charging appliances, and on lamps, steel, mileage ratings and tires have been prosecuting actively their work, which has consisted in a large measure of the collection of statistics and statements of established practise.

A report was made by the sub-committee on motors and controllers, discussing particularly the standardization of two motor voltages, which it is contemplated will be recommended for adoption at a later date, namely, 60 to 66 volts and 80 to 85 volts. The standardization of name plates was also discussed and recommendations will be made later. Discussion was also had on the testing of controllers, as well as on

PROGRAMME OF THE ANNUAL MEETING OF THE SOCIETY OF AMERICAN ENGINEERS.

Tuesday, Jan. 5, 9 A. M. and 8 P. M.

Meeting of the standards committee at the rooms of the society, 1790 Broadway, at 9 a. m.

Meeting of the governing committees of the sections, at the rooms of the society, at 8 p. m., and meeting of the council at the same hour.

Wednesday, Jan. 6, 10 A. M.

In the Auditorium, Engineering Societies' building, 29 West 39th street, New York City.

BUSINESS SESSION.

President's address.

Treasurer's report.

Report of tellers of the election of officers.

Report of membership committee.

New business.

Report of ball and roller bearings division—F. G. Hughes, acting chairman.

Report of carburetor fittings division—G. G. Behn, chairman.

Wednesday, Jan. 6, 1 P. M.

PROFESSIONAL SESSION.

"Recording Devices for Commercial Power Wagons"—Bruce Ford.

Report of truck standards division—William P. Kennedy, chairman.

Report of commercial car wheels division—William P. Kennedy, chairman.

Report of electric vehicle division—A. J. Slade, chairman.

INFORMAL DINNER, AT 6:30 P. M.

At Engineers' Club, 32 West 40th street, New York City.

Wednesday, Jan. 6, 8 P. M.

"Pros and Cons of Correct Tire Inflation"—C. B. Whittlesey.

Report of pleasure car wheels division—Henry Souther, chairman.

"Wire Wheels Versus Wood Wheels"—R. B. Mudge.

"Wire Wheels Versus Wood Wheels"—George W. Houk.

Report of lock washer division—J. E. Willson, chairman.

Report of miscellaneous division—J. G. Utz, chairman.

Thursday, Jan. 7, 10 A. M.

PROFESSIONAL SESSION.

Report of electrical equipment division—A. L. Riker, chairman.

"Railway Gasoline Locomotives"—A. H. Ehle.

"Railway Motor Cars"—H. G. Chatain.

"Warning Signals"—Alden L. McMurtry.

Report of research division—David L. Gallup, chairman.

Thursday, Jan. 7, 1 P. M.

PROFESSIONAL SESSION.

"Malleable Iron Castings"—Dr. Richard Moldenke.

Report of frame sections division—J. G. Perrin, chairman.

Report of iron and steel division—Henry Souther, chairman.

Nomenclature for car parts.

"Allowances for Piston Flts"—E. W. Weaver.

"Worm Gears"—C. T. Myers.

INFORMAL DINNER, AT 6:30 P. M.

At the Engineers' Club, 32 West 40th street, New York City.

Thursday, Jan. 7, 8 P. M.

PROFESSIONAL SESSION.

"Automobile Engineering Curricula"—Prof. W. T. Fishleigh.

"Motor Car Testing"—A. B. Browne.

Report of springs division—C. W. McKinley, chairman.

Report of standards exchange division—K. W. Zimmerschied, chairman.

"The European Situation as Affecting America"—A. Ludlow Clayden.

that the thickness of the permanent metal felloe band for motor truck wheels be increased from $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch for single solid tires. This recommendation was made in view of the communications received from commercial car manufacturers and users and wheel manufacturers. In the standard of the society accepted some years ago the thickness of the felloe band was $\frac{1}{4}$ -inch for equipment up to $4\frac{1}{2}$ -inch single tires and $\frac{3}{8}$ -inch for equipment with $4\frac{1}{2}$ -inch and larger tires. It appears that the $\frac{1}{4}$ -inch felloe band is not thick enough to give the draft that is necessary in wheel construction for four-inch single tires.

These recommendations were accepted by the standards committee.

The division also recommended for acceptance at a later meeting an increase in felloe band thickness from $\frac{3}{8}$ -inch to $\frac{1}{2}$ -inch for six-inch dual tires and over. In

the matter of their ampere rating, insulation, etc.

A committee of the underwriters' laboratories has been appointed to investigate fire risks in connection with electric vehicles and gasoline vehicles having electric equipment. It was stated that the said organization is not informed as to good current practise or as to the elements of fire risks existing in the stated classes of vehicle. The co-operation of the S. A. E., through the electric vehicle division, in accumulating data by which the underwriters would be enabled to formulate a code, has been requested.

The committee on batteries, wiring and charging appliances will make recommendations later on a wide range of subjects, including the grouping of cells in battery trays, the number of cells in standard battery equipment, with the intention of recommending 42 cells lead and 60 cells Edison, wiring sizes, insulation,

charging receptables, fuses, polarity of battery terminals and other allied matters. The committee on lamps will submit later recommendations regarding lamp bases, voltage and other matters, depending to some extent upon the adoption of standard battery voltages.

Speed and Mileage Ratings.

The sub-committee on speed and mileage ratings made a report which, after very extensive discussion, was adopted by the division for submission to the standards committee for acceptance. The report read: "Electric vehicle speed ratings shall be based on continuous operation with a half load over hard, smooth and level roads or pavements at the actual average battery voltage. Electric vehicle mileage ratings shall be based on the rated five-hour discharge capacity of the battery and a continuous run with half a load over hard, smooth and level roads or pavements". These recommendations were approved by the standards committee.

Test of Solid Rubber Tires.

A report on extensive efficiency tests made of solid rubber tires was submitted by the committee on tires. The tests were made with the scleroscope and the Whitney tire tester, and were also checked by road performance. The matter is still under investigation and will be reported on at a later date.

Industrial Trucks.

Numerous matters were brought before the electric vehicle division and referred to the respective sub-committees. Among these was the question of standardization of the electrical features of industrial trucks. This will also be reported on later.

HORSE HAULAGE CRIPPLED.

Through the action of the secretary of agriculture of the United States, 15 states have been quarantined against the foot and mouth disease. This quarantine covers cattle, sheep, swine, poultry and horses. In the districts affected the horse transportation is practically crippled, and the motor truck has been called upon to assume the burden of the horse to a greater extent.

The states affected by the quarantine are Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Wisconsin and two counties in Montana. In Kentucky, Montana and Oklahoma, horses under quarantine in other states are barred.

COMPETE WITH TROLLEYS.

The report of the Puget Sound Electric Company, recently filed with the state public service commission of Washington, is significant as showing the effect of motor freight and passenger service on local transportation conditions. The report shows that the local passenger business of the electric company

dropped more than one-half in August, 1914, as compared with the same month in 1913, while the through passenger total remained the same, this being directly attributed to the many motor trucks and passenger vehicles operating from Seattle.

MOTOR 'BUSES CARRY 11,276,430.

The Fifth Avenue Coach Company, New York City, which operates the Fifth and upper Seventh avenue and Riverside Drive 'buses, carried 11,276,430 passengers during its past fiscal year. This is an increase of 2,391,896 over the previous year.

The total operating revenue was \$1,176,650, and the total operating and other expenses were \$949,977. The final surplus, after allowing for the interest on the bonded indebtedness, mortgages, etc., was \$180,262, an increase of \$49,341 over 1913. The 'buses made 227,600 round trips during the year and covered 2,919,110 miles.

MOTOKART TO ERECT PLANT.

Arrangements have been completed between the MotoKart Company, Inc., New York City, and the Scranton board of trade whereby the Scranton Industrial Development Company and the Traders' National bank of Scranton will finance the erection of a large plant for the MotoKart Company in Scranton. Ground for the northwestern wing of the plant will be broken at once, and it is anticipated that the first section of approximately 45,000 square feet of floor space will be ready for occupancy about Feb. 1 next.

TO SERVE CALIFORNIA FARMERS.

Points in the Imperial valley, California, which are remote from the railroads, are to be served by motor trucks running on regular schedule to San Diego, and moving the farm products which, under the present conditions, spoil for want of transportation facilities, the loss in this way amounting to 40 per cent. or more. Six 2½-ton cars will cover the route through the valley, a distance of 122 miles over desert and mountain roads, and will provide facilities which will greatly aid the farmers located in this very fertile territory.

AMERICAN TRUCKS FOR FRANCE.

It is said that the Pierce-Arrow Motor Car Company, Buffalo, N. Y., has received an order from the French government for 300 five-ton trucks, amounting in money to about \$1,000,000, and that other orders from the same purchaser are expected to follow. It is also stated that France has ordered 200 five-ton trucks from the White Company of Cleveland, O., and that other European governments are making large purchases of motor vehicles in the American market.

THE A B C OF MOTOR TRUCK IGNITION.

Part XXVIII—Construction and Operation of Type G4 Eisemann Magneto, a True High-Tension Instrument, Which Differs from Conventional Practise in That Two Springs Are Utilized in the Interrupter Mechanism.

By C. P. Shattuck.

WITH the types of magnetos previously discussed, the rocking lever is generally employed for interrupting or breaking the primary circuit. With the exception of two or more makes, the separation of the contact points is obtained by this method, it involving the use of a movable lever generally attached to and revolving with the armature shaft. Generally the lever is actuated by coming in contact with segments in the circuit breaker housing.

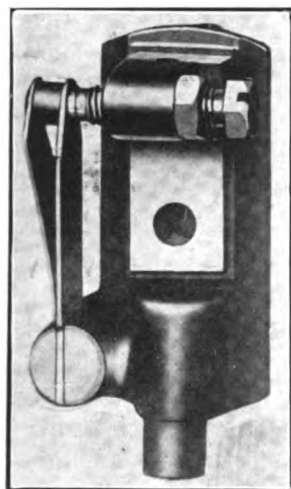


Fig. 174—Eisemann Make and Break Mechanism.

An instrument, which differs radically from the conventional forms in respect to the circuit breaker mechanism, is the type G4 Eisemann, brought out recently by the Eisemann Magneto Company, Brooklyn, N. Y., maker of the well known Eisemann magnetos.

How Eisemann Differs.

The device for opening and closing the primary circuit of the instrument is shown at Fig. 174, and as may be noted, is distinctly different from the designs previously discussed. It is a very simple construction, readily accessible for adjustment or cleaning, and one of the features emphasized by the maker is that it is not subject to any hammering action.

It consists of a bronze plate on the back of which, and integrally cast with it, is a cone that fits into the end of the armature shaft. The construction is retained in place by a screw, which also serves as a connection between the end of the primary current and the insulated contact block. The method of conveying the primary current to the contact points follows conventional practise, and the grounding of the electricity or the stopping of the motor is accomplished in the regular manner.

Two Springs Employed.

A boss or stud on the bronze plate above referred to is slotted to take two springs, these being the contact and pressure members. They are retained in position by a screw, which is easily displaced, making it a simple matter to renew the parts when a replacement is necessary.

The insulated portion or block is threaded to take

a platinum tipped contact screw, which is provided with a hexagonal head and a lock nut. This screw is a fixed member and normally is in contact with a spring carrying a platinum point. Contact between the two points is maintained by the pressure of another spring, the tension being obtained by the use of a stud between the two springs.

The separation or break of the contact points is secured by the touching of cams on the contact spring. These cams are of fibre inserted in the timing lever, which is shown removed from the instrument at Fig. 177. The illustration depicts three projections, but one of these, the upper, is a wick, which is saturated with oil to provide lubrication for the cams and contact spring.

Function of the Cams.

The cams which cause the separation of the contact points are diametrically opposed, or 180 degrees apart, thereby causing the contact points to be separated twice every revolution of the armature shaft, obtaining two sparks to each complete revolution of the armature, which is driven at crankshaft speed with four-cylinder, four-cycle motors.

It should be explained that the fibre cams have a round surface and that they are stationary, except when the timing lever is moved to retard or advance the spark. The maker states that the spring type of contact secures noiseless operation, that the rolling motion of the cams assures the long life of the platinum points, and that the make and break is very posi-

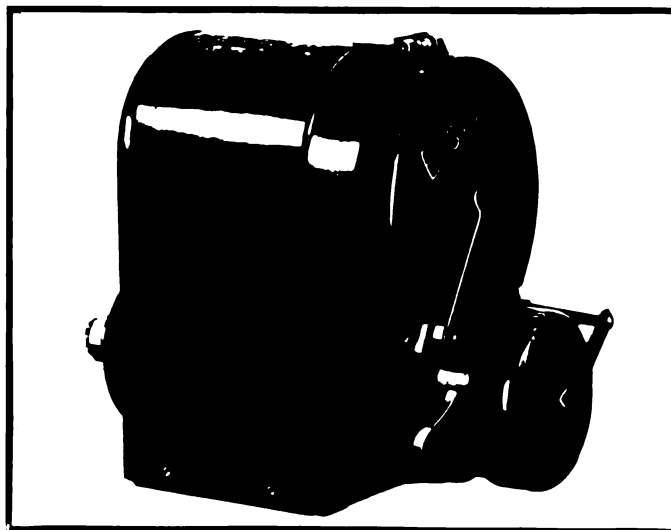


Fig. 175—Type G4 Eisemann Magneto, a True High-Tension Instrument, Noticeable for Its Simplicity and Water and Dust Proof Features.

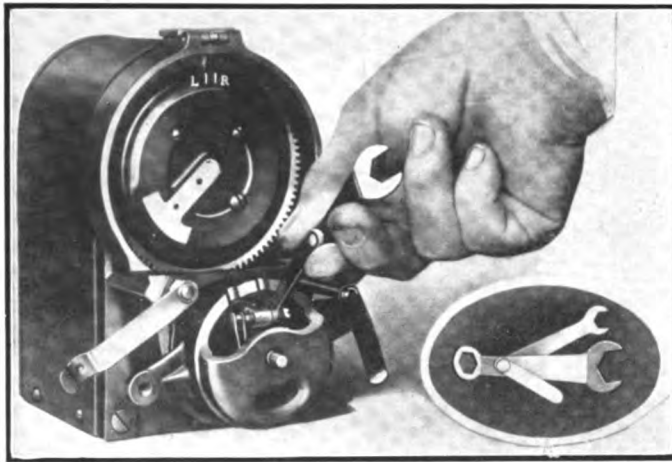


Fig. 176—Illustrating the Accessibility of the Make and Break Mechanism When Adjusting Gap of Contact Points.

tive. Replacement of worn parts is easily made.

One of the desirable qualities of the construction is the accessibility of the components and the ease with which the fixed contact screw can be adjusted. The method is illustrated at Fig. 176 and the work is accomplished by slipping the spring from the end cap and utilizing the wrench as indicated.

The correct gap of the contact points is $1/64$ -inch and, to decrease it after it has been augmented by wear, the lock nut is loosened and the screw member turned in or forward. The gap is tested in the usual manner with the gauge and this work is performed with the contact points fully separated, which will be the case when one of the cams is making contact with the contact spring. The timing lever is removable, but it is not necessary to displace it when adjusting the gap of the contact points.

Grounding Primary Current.

Referring once more to Fig. 174, it will be seen that the circuit breaker mechanism carries a carbon brush, which is termed the ground brush. The screw securing the breaker proper to the armature shaft is provided with a copper brush, which is the short circuiting brush. This brush is in contact with a metal insert in the end cap and to this insert is connected the cable leading to the switch, thence to ground, as shown in the wiring plan at Fig. 180. When the switch lever is moved to the "off" position, the primary current is grounded or diverted from the secondary windings of the armature. The method of attaching the primary cable is indicated at Fig. 177, one obtaining an end cap free from terminals.

In a number of respects

the Eisemann type G4 magneto differs from its predecessors, particularly in the design of the distributor, which is shown removed at Fig. 177. The collector ring is placed on the same end as the distributor plate, eliminating the brushes and conductors generally employed in conventional practise. As may be noted by the illustration, the distributor plate is provided with an integral brush holder, a carbon member which transmits the high-tension current direct to another carbon brush in the centre of the plate.

The centre brush makes contact with the T shaped metal insert in the plate or disc, and the last-named member is attached to the distributor gear and rotates with it. The distribution of the intensified current to the various spark plugs is made, in the usual manner, by carbon brushes.

The distributor plate is retained in place by a lever or spring as shown at Fig. 175, and its fit is such that water, dust or foreign elements are excluded. By slipping the spring member to one side the disc may be easily and quickly displaced.

Cables Well Secured.

Careful attention has been paid to the proper fastening of the high-tension cables to the terminals of the distributor plate and, as may be noted by reference to Fig. 177, the cables are passed through circular openings, the diameter of which is such as to obtain a snug fit—one preventing the entrance of foreign matter.

The method of securing the cables is stated to be patented, and is shown at Fig. 179. That at A illustrates how the connection in the end cap is made. The insulation is stripped from the primary wire, the metal strands inserted, and the binding screw is set up tight, thus locking the wires securely.

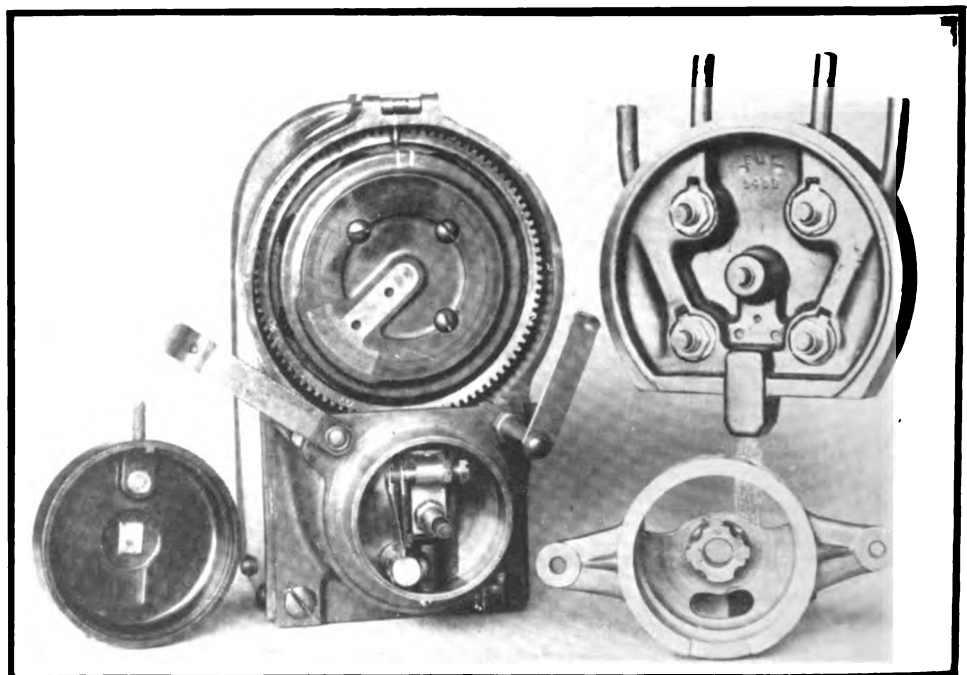


Fig. 177—Eisemann Type G4 Magneto with End Cap, Timing Lever and Distributor Disc Displaced to Show Make and Break Mechanism and Method of Locking Cables.

The high-tension cables, those carrying the intensified current, are securely fastened, as may be noted by the illustration at C. About $1\frac{7}{8}$ inches of the insulation is stripped and the bare wires passed through the circular opening in the disc, given one right hand turn around the binding post, and locked by means of a split washer and hexagonal nut.

Other Eisemann Features.

In other respects the new magneto embodies Eisemann principles of construction, including the Eisemann pole pieces, which have been described and illustrated in previous installments. The armature carries two windings, a primary and a secondary, revolves on ball bearings, and the condenser is built in at one end as shown at Fig. 178. The maker lays great stress upon the material and workmanship employed, and states that the construction with the pole pieces and magnets will provide so efficient a spark that the motor may be started at as slow a speed as the carburetor will permit.

The type G4 is driven at crankshaft speed for four-cylinder, four-cycle motors, and twice crankshaft speed for four-cylinder, two-cycle motors. It is produced with variable and fixed ignition timing levers.

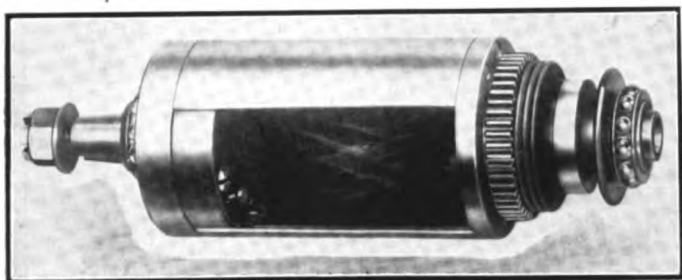


Fig. 178—The Condenser is Built in at One End in the Eisemann Armature.

the former providing a range of 30 degrees.

The usual safety spark gap is incorporated, consisting of two pointed screws placed inside of the gear housing at a certain specified distance from the collector ring. Its function has been explained in previous discussions.

Compactness a Feature.

As may be understood by the above description, the type G4 is a true high-tension instrument. It is very compact and the simplicity and neatness of its construction are among its features. All the components are proof against the action of water or road dust, and the overall dimensions are such as to favor installation on motors where the space is limited.

The indicating window is dispensed with in the new instrument but, as the distributor plate is easily removed, identification marks on the disc are utilized. These include a letter R and L, indicating clockwise (right) and anti-clockwise (left) instruments. The line beside each letter should register with the setting screw and, when in this position, the armature shaft is coupled to the driving member.

The wiring plan is shown at Fig. 180, and both the key and kick type of switches are indicated in the

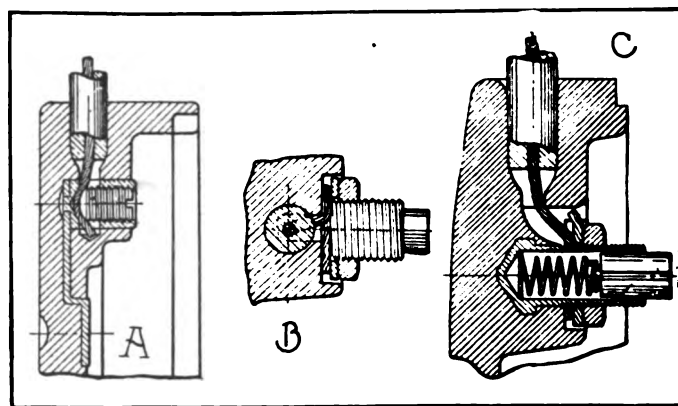


Fig. 179—Showing the Efficient Method of Retaining the Primary and Secondary Cables.

drawing. The kick form is designed primarily for commercial vehicles, is very strong and substantial, and the switch may be removed from the "off" position.

(To Be Continued.)

OVERLAND DEALERS HOLD CONVENTION.

Thirty of the dealers representing the Overland-Connecticut Company, which is the distributor of the Overland car in all the counties of Connecticut except one, met recently at Hartford for a business convention and were addressed by members of the local management, as well as by representatives direct from the factory.

GRAMM TO ENLARGE PLANT.

The stockholders of the Gramm Motor Company, Lima, O., have voted to enlarge the plant to almost double the present capacity, and will turn out five trucks a day of the 1350-pound model, which alone will be built in the future.

NEW JERSEY TRUCKS MUST HAVE MIRRORS.

Commencing with Jan. 1 next, all trucks in New Jersey must be equipped with mirrors to enable the driver to see the road behind him. This is being done for the protection of vehicles in the rear.

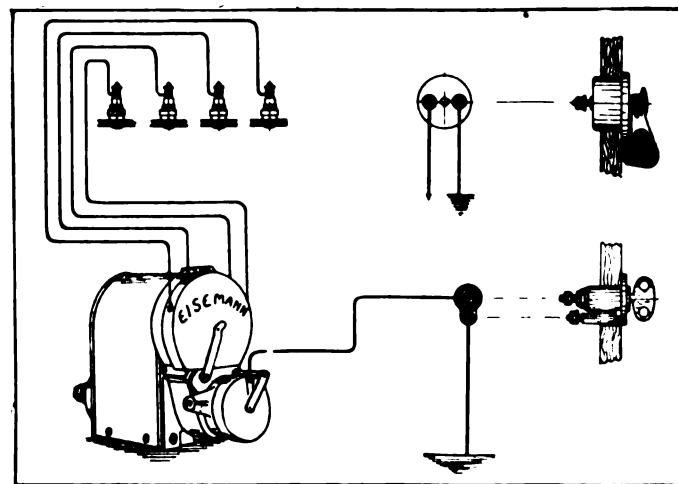
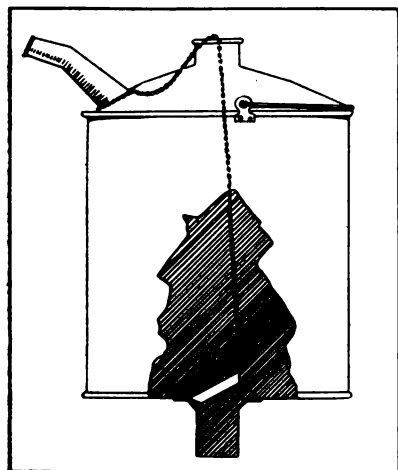


Fig. 180—Wiring Plan of Eisemann Type G4 Magneto with Key and Kick Form of Switches.

HINTS FOR PROPER MAINTENANCE.

VARIOUS vessels are utilized for renewing the supply of water or fuel. A suggestion for making a filler member, one that is inexpensive, is contributed



Easily Constructed and Inexpensive Filler Member.

by Hugh H. Knapp, Chardon, O. The material required is an ordinary five-gallon can, suitable length of chain, a one-inch hinge check valve, and a piece of brass or tin, materials easily obtained.

As may be noted by the drawing, a hole is cut in the bottom of the can, and it should be about one inch less in diameter than the

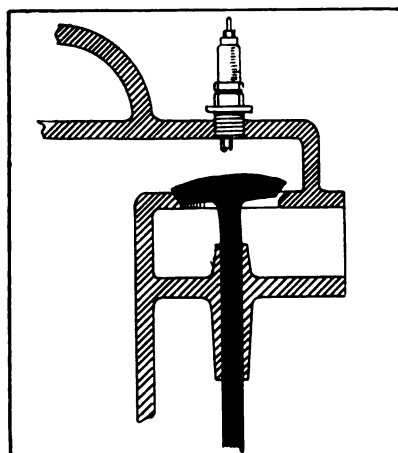
brass or tin strip to which the check valve is attached. The last-named member is soldered to a circular piece of brass or tin having a diameter of seven inches, if the hole in the can be six inches, for example.

To assemble, the chain is passed through the opening in the bottom of the container and up through the top as shown in the sketch. The strip of metal carrying the check valve is then soldered to the can. To complete the filler, a piece of tubing is attached to the outer end of the check valve.

The inventor of the filler states that its contents can be emptied into a tank without spilling and that control is obtained by the use of the chain, releasing it when it is desired to stop the flow of the fluid.

WARPED VALVE STEMS.

If after grinding in the valves, one fails to seat properly, it will generally be found that the cause of the trouble is a warped valve stem. The misalignment may not be pronounced, but it



An Exaggerated View of a Warped Valve Stem.

may be sufficient to cause the stem to stick, especially at low motor speeds.

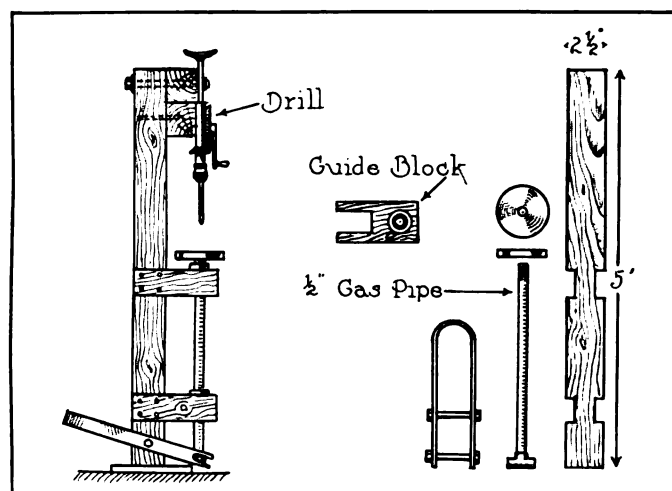
An accompanying illustration shows an exaggerated case of the warped valve stem and how it prevents the valve from seating. Not only will such a condition result in erratic oper-

ation of the motor, but undue wear of the valve guide bushing, allowing extra air to be drawn into the cylinder, thereby diluting the mixture. The valve stems should be tested for binding before the work of grinding is commenced, and any misalignment corrected.

MAKING A SENSITIVE DRILL.

A practical use of a breast drill for drilling and countersinking a number of holes in several pieces of metal, and where accuracy was essential, is described in the Commercial Motor, an English commercial car publication. The material utilized and method of assembly is shown in an accompanying illustration.

The main upright comprises a joist, 2½ inches square and about five feet two inches long. Two pieces were cut, eight and six inches long respectively, and planed smooth. To one end of the longest piece is at-



Improved Sensitive Drill and Details of Construction.

tached the eight-inch strip, and the smaller one is made into the guide block, as shown. The main pillar is cut to the shape illustrated in the drawing to accommodate two guide brackets. The base is constructed of one-inch timber, four inches square, this being fastened to the bottom of the post and secured to the floor.

A piece of flat iron, 1¼ inches wide and ¼-inch thick, is bent to the shape of a stirrup, and the open end is drilled to take four ⅜-inch bolts. For the table a piece of ½-inch gas pipe is cut off to a suitable length, both ends threaded and a ½ by ⅜-inch tee fitted to the lower end to form a swivel joint in the stirrup. By filing the hole of a gas flange, a sliding fit is obtained in the pipe, and the former is secured to the guide block by three set screws. The gas pipe is then threaded through the guide block and flange, and a large flange screwed to the top end of the barrel to form the drilling table.

To place the breast drill in position, a piece of

wood is so cut as to clear the mechanism of the drill, and attached as illustrated. The distance between the point of the drill and the table is four inches and the work is fed up to the drill by means of the stirrup, which acts as a pedal. When using an extra short drill on thin plates, the work can be packed to the drill itself with pieces of wood.

USE FOR MAGNETO WRENCH.

One of the best uses to which a magneto wrench can be put, aside from setting the gap of the contact points, is as a gauge for the gap of the spark plugs. Practically every maker of a magneto supplies a wrench with a gauge attached, which is very accurate as to dimensions. The gap of the spark plugs should be set according to the gauge, regardless of the type of plug used. There are, however, some makes of spark plugs to which the magneto wrench gauge is not adaptable. This gauge is not expensive and one should be carried in the tool box, as its services may be required when on the road.

CARE OF GREASE CUPS.

The attention generally given to the grease cups on the chassis consists of replenishing the lubricant supply. It is a good plan to remove the old lubricant occasionally, clean the cup thoroughly, and pass a wire through the passages communicating with the part to be lubricated. This will remove any hardened grease which may have clogged the passage.

LONG DISTANCE DELIVERY BY TRUCK.

The Morlite Oil Company, Warrensburg, Mo., has in service a Kissel-Kar truck, fitted with a 500-gallon tank, for oil delivery to its 14 customers located outside of Warrensburg, and from six to 20 miles apart, in addition to the 22 stores in town which it serves. Daily deliveries are made with the single car, and a crew consisting of driver and helper, whereas a competitor uses two horse drawn vehicles with three men. The truck visits the city stores first, and then six or seven in the country, generally completing the day's work before 5 in the afternoon. The average monthly consumption of fuel and lubricant is stated by the owner to be 100 gallons of gasoline and five gallons of oil.

NEIGHBORS PAY TRUCK'S UPKEEP.

Neighbors of Raoul Dupuy, a farmer living near Montreal, in the province of Quebec, pay him for the upkeep of his model J Reo truck. Mr. Dupuy uses the truck to market his farm products and milk, and has hit upon a neighborhood delivery scheme which, as a side line, not only pays for the upkeep of the truck, but nets him a neat sum of money besides. Every

morning Mr. Dupuy transports his farm truck and garden stuff 12 miles to the Montreal market. After disposing of his produce he loads his car with food supplies and merchandise for his neighbors. On the return trip to the farm he distributes barrels of flour, kegs of paint and nails, and boxes of dry goods along the route. In the late afternoon the day's milk supply is ready for city delivery and back goes the truck to Montreal with its load of milk cans. All in all, the truck is in use on an average of 20 hours a day by Mr. Dupuy and his men, and its work is found vastly more efficient and much less expensive than the old fashioned method of team hauling.

TO CHECK TRUCK ROBBERIES.

The increase in the thefts of motor trucks has led to action by the Merchants' Association, New York City, and a recommendation has been made to Police Commissioner Woods of steps which should be taken to improve the situation. A system of picketing is advised whereby, upon the report of the disappearance of a truck, officers stationed at those points which must be passed by cars leaving the city, will be at once notified and will keep a careful watch for the stolen vehicles. To aid in locating cars which are turned over to the many stables and shops of dubious reputation which act as fences in the disposal of this sort of booty, it is urged that a record be kept of places of such character, and an immediate search of them be made for cars reported to have been stolen.

FERRY RATES HAVE BEEN RAISED.

Rates for automobiles on the ferry operated by the Pennsylvania railroad between Camden, N. J., and Philadelphia, Penn., have been raised, the old flat rate of 25 cents for each car being superseded by a charge of 25 cents for the car and four passengers and an additional three cents for each passenger in excess of that number.

TAX OUT-OF-STATE CARS.

At the recent convention of the New York State Automobile Association, a tax of four cents a gallon on all gasoline used in New York by cars from outside the state touring under the reciprocity privilege was suggested by State Highway Commissioner John N. Carlisle. A heavy tax on motor trucks and omnibuses was also advocated on the ground that this class of traffic wears out the roads very rapidly.

The Berkely-Fourness Company, organized at Madison, Wis., several weeks ago to manufacture die castings, including a regulator for motor car lighting systems, has established a plant at 619-621 William-street, Madison. The company will also manufacture an improved lock nut for motor cars and railroad work.

HAULED BIG COAL TONNAGE.

Seven-Ton Sternberg Carted 1360 Tons in 216 City Trips in 10 Days.

The work of a seven-ton Sternberg truck in a service test in New York City was of such character as to impel an order for three of these machines to be used in general haulage in the Metropolis, and as this was in the nature of a competition, it is of unusual interest. Richard Fitzpatrick, stevedore and trucking contractor, with offices at 452 West 19th street and 640 West 132nd street, whose business is general in Greater New York, desired to determine a size of truck that would be best suited to his needs, and with this purpose in mind engaged six different machines to do work that would be approximately the same so far as operating conditions were concerned.



Sternberg Seven Ton Truck That Hauled 1360 Tons of Coal in 10 Days, Making 216 Round Trips, and at No Time Loaded to Its Capacity.

These tests were paid for by Mr. Fitzpatrick at prevailing rates and the work was continued a sufficient period of time to learn conclusively which machine was the better suited for the work that he purposed to do. The trial with the Sternberg truck continued for a period of 10 days, during which time 216 loads were hauled, or an average of 21.6 loads daily, and the total tonnage was 1360, or 136 daily. The average length of haul is not stated, but aside from the first day of which record is shown, these ranged from 18 to 30, and the tonnage from 110 to 186.

During the period 175 gallons of gasoline were placed in the tank, and 49 quarts of oil were supplied in the same length of time. One will note that the machine was not assumedly loaded to its capacity, for by taking the average of the weights for each of the days one will find that while these differed as much as 1228 pounds, yet not a daily average was up to the maximum load of the machine. In fact the average

loads were from 500 to 1778 pounds less than maximum, the average being 1407 pounds less than capacity, or approximately 12 per cent. The following tabulation is of especial interest:

Date	Fuel, gas. gals.	Oil, quarts	Trips daily	Gross tonnage	Less max. load capacity, lbs.	Average load in lbs.
Sept. 4	15	1 1/2	8	50	12,500	1500
Sept. 5	22	7	30	185	12,333	1667
Sept. 8	23	9	30	186	12,400	1600
Sept. 10	15	18	18	110	12,222	1778
Sept. 12	8	21	21	141	13,429	561
Sept. 14	19	7	20	135	13,500	500
Sept. 15	15	7	18	110	12,222	1778
Sept. 16	14	3	29	182	12,552	1448
Sept. 17	19	7	21	130	12,381	1619
Sept. 18	15	5	21	131	12,476	1524
	175	49	216	1360	12,592.60	1407.40

In the test the truck's actual tonnage was 30 per cent. greater than that of any other truck tried, and the next best showing was made by a five-ton machine that was rated as having speed of 18 miles an hour. The mileage to the gallon of fuel cannot be given, for the length of the hauls is not averaged, as are the other factors.

The seven-ton Sternberg truck used in this competition was a standard stock construction and it was equipped with a regular wooden body of the rear end discharge type, this having a heavy frame and being carried on sills and bolsters placed on the chassis frame. The end gate is a type that can be controlled so that the load may be discharged by gravity, and the body is elevated by a hydraulic hoist located on the frame behind the seat of the driver. So far as possible the loading is by gravity from chutes, and unloading is by elevating the body with the hydraulic hoist, it being operated by a lever from the driver's seat, that couples a clutch on the driving shaft with the pump that forces the circulation of oil through the trunk cylinder of the hoist. This construction is conventional and has been found extremely useful and economical in varying services.

SIGNAL AGENCY IN ST. LOUIS.

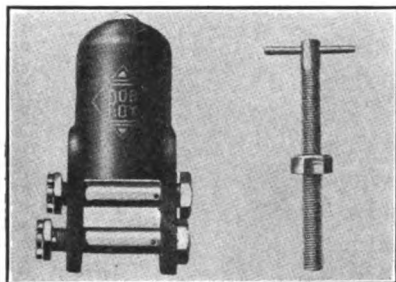
The Best Service Truck Company has taken the agency for the Signal line of motor trucks, the contract covering eastern Missouri and southern Illinois.

The Vacuum Oil Company, New York, N. Y., has declared a regular semi-annual dividend of three per cent., payable Oct. 30, to stock of record Oct. 15.

NEW COMMERCIAL CAR ACCESSORIES.

ROB-ROY SHOCK ABSORBER.

The Rob-Roy shock absorbers are produced for the model T Ford car by the Rob-Roy Manufacturing Company,



259 Willis avenue, East, Detroit, Mich. The effects of vibration and shock are compensated for by a heavy spring enclosed in a dust proof iron cylinder. The spring is retained in the centre of the cylinder by the spring seat, and it is stated that it does not contact with the walls, thereby eliminating friction. The cylinder is attached to the car by two heavy spring shackles and the shackle and cylinder are a unit construction.

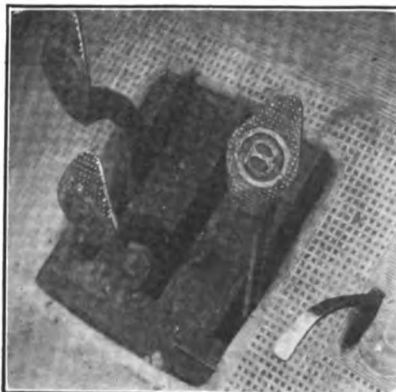
High-grade material and workmanship are qualities emphasized in the construction by the maker. The spring is of oil tempered steel and the bolts are hardened and ground. They are lubricated by dust proof oilers and grooved to insure proper lubrication of the bearing surfaces. The cylinder enclosing the spring is black enamel, baked on.

The company states that a set can be installed in 30 minutes by the motorist and that the only tools necessary are a wrench and the special tool supplied with each equipment. It is claimed that it is not necessary to displace the wheels, hangers, tierod or other components of the car.

SIMPLEX FORD ACCELERATOR.

Will A. Sapp & Co., Elgin, Neb., is manufacturing the Simplex accelerator for the model T Ford motor, which is a simple and practical device for controlling the quantity of mixture passing to the cylinders. One of the desirable qualities of the Simplex is that it does not interfere with the operation of the usual throttle and either can be employed independently of the other.

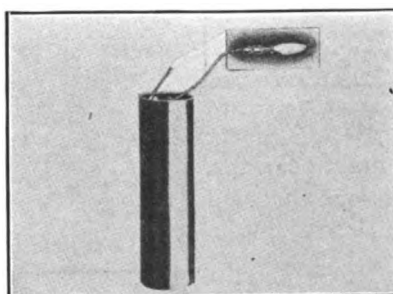
The accelerator proper is attached to the inspection plate of the transmission housing and is connected by means of a chain and pulley to the throttle lever of the carburetor. A spring of proper tension returns the lever to a closed position, when the accelerator is relieved from the pressure of the foot. The tension, however, is adjustable. The Sim-



plex enables control of the car speed without displacing the hands from the steering wheel.

PREST-O-TORCH.

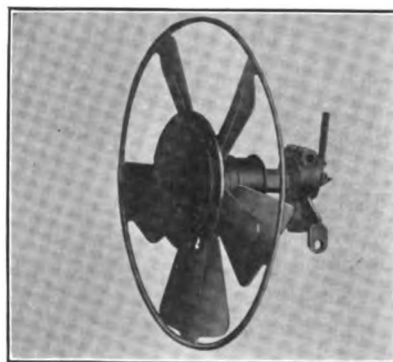
The Prest-O-Torch, made by the Prest-O-Lite Company, Inc., Indianapolis, Ind., is a useful and practical accessory, as with it soldering and brazing may be accomplished without resorting to the gasoline torch, etc. One of the desirable features of the Prest-O-Torch is that it can be connected to the Prest-O-Lite tank. The torch is but two inches long and $\frac{1}{2}$ -inch in diameter. Its compactness makes for convenience in storing, as well as enables the user to reach places not easily accessible with the usual soldering equipment. The flame of the Prest-O-Torch is small, but it is intensely hot. It is easily controlled, as the supply is taken from the gas tank.



It can be used out of doors as well as in the garage.

BEARTONE FAN HORN.

The Oakes Company, Indianapolis, Ind., is marketing the Beartone signal, which is a combination fan and horn. The maker states that it embodies the same mechanical action as the high-grade motor driven horn, but requires no current or wire for operation. It has the same action as a hand horn, but is

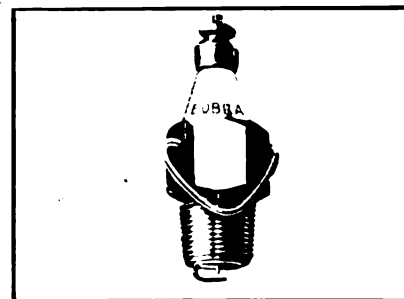


operated by pressing a button, and one of the features of the new signal is that the volume of sound may be varied by the pressure. A desirable quality of the signal is that the horn cannot be operated when the motor is not running, which prevents tampering with it when the driver is absent.

Ed. Note—Manufacturers, distributors and agents of commercial motor vehicle accessories, supplies and equipment are invited to forward illustrations and descriptions of their product for use in this department. If cuts are supplied, they should not exceed 2½ inches. Photographs are preferred. Illustrations or cuts will be returned, if desired. When supplying descriptive matter, the name and street address of the maker should be given, and if marketed by a distributor it should be so stated.

BOBRA SPARK PLUG.

The Bobra Spark Plug Company, Dayton, O., is introducing the Bobra spark plug, which differs from conven-



tional practise in that the porcelain is not only removable, but carries both electrodes. As may be noted by the accompanying illustration, the porcelain is displaced from the shell without the aid of a wrench or other tool.

This arrangement makes it a simple matter to clean the plug, as well as to adjust the spark gap. One of the desirable qualities of the Bobra is that it provides ready means for priming a cylinder not fitted with petcocks. A ball is utilized to retain the insulator in position. The Bobra is made in three sizes, S. A. E., standard and metric.

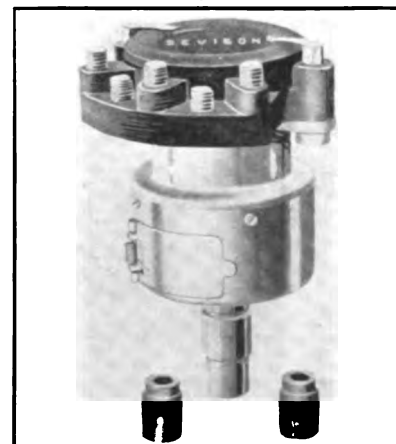
SEVISON IGNITION SYSTEM.

The Sevison Electric Company, Elkhart, Ind., is manufacturing the Sevison ignition system, the invention of L. J. Sevison, who has been identified with the production of ignition apparatus for a number of years.

The system utilizes a direct current and consists of a mechanically operated circuit breaker, a single unit transformer coil and dash switch. The arrangement provides for the current supply being a storage battery or dry cells.

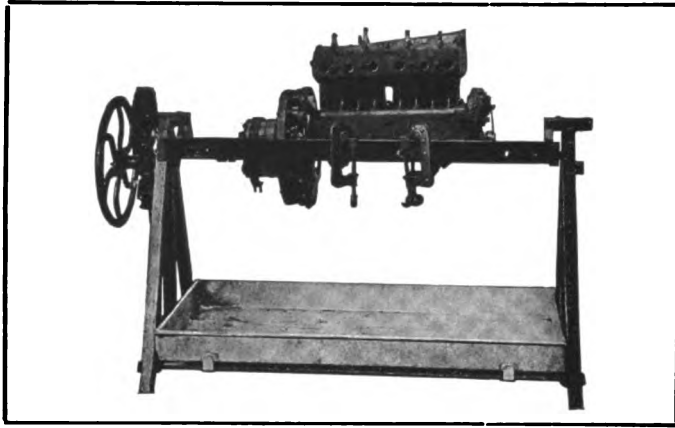
The circuit breaker has no oscillating journals and is made of large hardened steel parts. The maker calls particular attention to the contact points, stating that they will not arc or require filing. Only one spark is produced, and the system is held to be very economical of current. All components are fully enclosed, water and dust proof, and are readily accessible. The Sevison system is adaptable to two, four and six-cylinder motors.

The Sevison unit is designed to be mounted on the motor in place of any standard magneto. The base of the unit is the same as is the height from the bottom of the base to the drive shaft. This permits the use of the regular driving members and makes for easy and inexpensive installation.



NEW MACHINERY, TOOLS AND EQUIPMENT.

IN THE overhaul of the power plant considerable time can be saved by a suitable engine rack, one permitting the motor to be swung to positions making



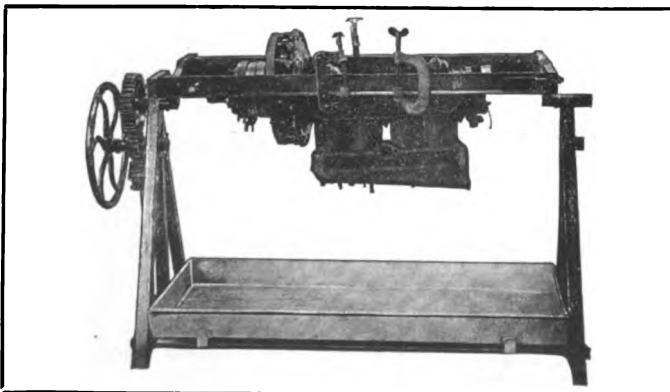
St. Albans Engine Rack, Adjustable to Any Size of Motor and to Many Different Positions.

for convenience, as when adjusting the main bearings, for example. The practical motor rack is one that will accommodate unit power plants as well as a single-cylinder engine.

The St. Albans Foundry and Implement Company, St. Albans, Vt., is manufacturing the St. Albans engine rack shown herewith, and one of the desirable qualities of the construction is that the pivoted table is easily and quickly adjusted to all types of motors.

The various positions are obtained by rotating a hand wheel and, by means of gearing, the heaviest motor may be swung to the desired position with ease. One of the advantages of the rack is that the table may be locked in any of the 32 positions obtained by the use of a simple foot mechanism. This leaves both hands free.

The construction is of metal, practically indestructible, and the design is very compact. It occupies a floor space of about five feet nine inches by 37 by 30 inches. As may be noted by the accompanying illustration, a removable galvanized drip pan is part of the equipment, permitting washing the motor with fuel or kerosene. The pan also serves to prevent the loss of nuts or parts that may be dropped during the dis-



Showing Motor in St. Albans Engine Rack in Position for Working on the Bearings.

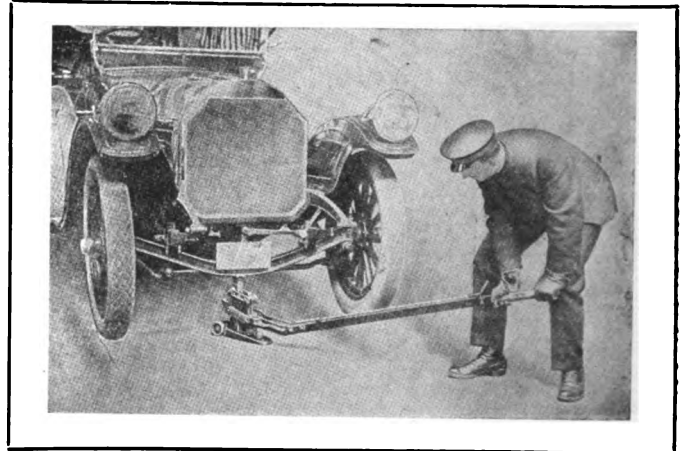
assembly or assembly. Complete details and prices will be supplied upon request.

EXCEL AUTO JACK.

Any equipment that will save time and labor in the garage or service station makes for economy. Generally, when it is necessary to make adjustments to the steering gear, both wheels are raised free of the floor, or when removing the wheels, and usually two jacks are utilized, one at either end of the axle.

The Motor Specialties Company, Waltham, Mass., is marketing a useful tool, termed the Excel auto jack and, as may be noted by the accompanying illustration, one man can easily operate it. The jack has a capacity up to 8000 pounds and it will raise $4\frac{1}{2}$ inches from a starting point, and from four to 20 inches from the ground.

One of the advantages of the Excel is that it is too large to be mislaid. Not only is time saved in raising the car, but the jack can be placed in position and operated in less time than is required to locate the



Showing Ease of Adjustment and Operation of Excel Auto Jack Having a Lifting Capacity of 8000 Pounds.

usual members. It is easily used. It is rolled under the machine, the handle operated to bring the head of the jack in contact with the axle, and the handle pressed down. The maker states that the part can be raised in $4\frac{1}{2}$ seconds after rolling the jack into position.

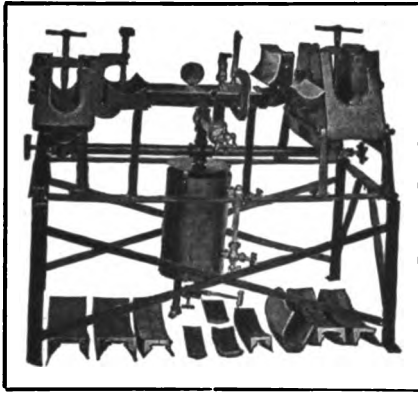
The Excel auto jack is constructed of the best of material and the workmanship is first class in every respect. It is moderately priced and is guaranteed. Prices and details will be mailed by the maker, upon request.

VANDERPOOL VULCANIZERS.

There is an increasing tendency upon the part of owners of commercial cars maintaining several machines equipped with pneumatic tires to install their own vulcanizing equipment, and not only does such a method effect economy in the maintenance of the ve-

hicles, but considerable time is saved in tire repairing.

Vulcanizing outfits are now produced to meet all requirements, and a practical equipment capable of vulcanizing tubes and repairing shoes may be obtained at a moderate cost. Their use does not necessarily involve much experience, as the instructions of the manufacturer are easily followed.



One of the Several Vulcanizing Equipments Produced by the Vanderpool Company.

The Vanderpool Company, Springfield, O., has specialized in the manufacture of vulcanizing outfits for a number of years and produces a large variety of apparatus to meet all requirements. One of the large equipments is shown in an accompanying illustration. The Vanderpool Company produces both service station and garage apparatus and will supply free, upon request, a catalogue describing its product.

CISCO MOTOR DRIVEN LATHE.

Electricity as a source of energy for operating machinery in the service station and repair shop is replacing other forms of power. It not only makes for convenience in that the power is always available, but economy is effected. Electrical equipment also eliminates shafting, pulleys and belts.

The Cincinnati Iron and Steel Company, Cincinnati, has brought out a new motor driven Cisco lathe, which is especially adaptable for garage and automobile work. It is a 16 by 8 engine lathe, and two improvements have been made over the previous types marketed by this company.

The points involved are shown in an accompanying illustration. The pull pin A is now so arranged that when at neutral the lathe can be run at high speed and all of the gears from the first compound thrown out, this being desirable for filing and work of a similar nature. At the point B, the lock on the half nut is so arranged that the lead screw cannot be clamped too tightly.

The beds on the Cisco lathes are now being constructed deeper and heavier, and semi-steel is now being utilized, making for perfect alignment as well as durability.

The lathe is driven by a $2\frac{1}{2}$ or a three-horsepower electric motor, either a direct current or alternating, variable or constant speed unit. The head itself provides three speeds, two controlled by a lever in the front to a friction

on the inside, and one open speed, secured through the face gear. The use of the open speed is obtained by placing the lever on the front of the head at the neutral position. The main shaft is provided with two bearings and the drive is by a rawhide pinion on the motor. The head is accessible both front and back.

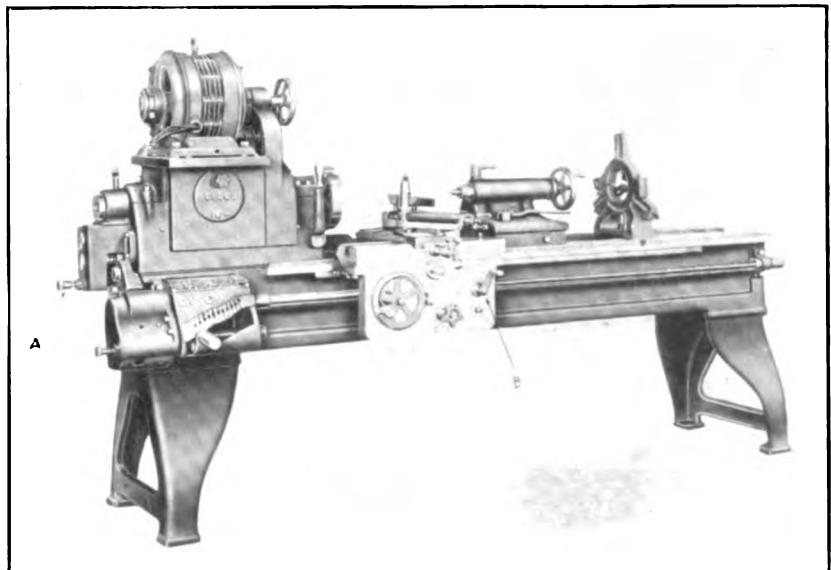
A number of minor improvements have been made in the Cisco lathes, such as higher nuts on the tail stock, etc. The Cincinnati Iron and Steel Company will supply complete details and prices of its product upon request.

KEARNS DRILL PRESS.

A drilling machine having a tilting table, allowing the latter to be swung at any angle, is being manufactured by the Kearns Tool Machine Company, Hamilton, O. It is a combination machine, as with it jigs and fixtures can be drilled without disturbing the original clamping. The design offers practically a combined horizontal and vertical drilling machine. In addition to the table, which is rigidly held to the saddle by four bolts, the machine has a complete equipment, such as wheel and lever, back gears, power feed and automatic stop. Details and prices will be supplied upon request.

STUDEBAKER EFFICIENCY.

The value of the Studebaker efficiency system in operation at its plant was conclusively demonstrated by the fact that the production record of September was made with a force only 60 per cent. as large as that which set the previous high mark. Of equal importance is the fact that, as a result of this reduction in the number of employees, wages have been substantially increased, the very careful supervision of the details of production resulting not only in a larger output for the factory, but greater earning power for the individual employees has also been developed.



The Cisco 16 by 8 Electrically Operated Engine Lathe Especially Adaptable to Motor Vehicle Work.

MUNICIPAL AND PUBLIC SERVICE NOTES.

MOTOR fire fighting apparatus, which is rapidly replacing that drawn by horses in the large cities, is of equal if not greater importance in smaller communities which, as a rule, are inadequately equipped to handle any large blaze. West Chester, Penn., is an example of this, and its solution of the problem is of interest because the condition which existed is typical of that of many other similar towns.

Four years ago the fire department of West Chester was equipped with a few pieces of apparatus, housed in small buildings, and drawn by hand. The borough, which has a population of something over 10,000, had been fortunate in having few fires, and the taxpayers were unwilling to support the permanent force necessary for the proper maintenance of horse drawn apparatus. Then, as was certain to happen, there came a succession of fires, none of which was reached in time for the building to be saved, and one of which, the Country Club, entailed a consider-



The Martin Motor Combination Which Has Superseded Hand Drawn Apparatus in West Chester, Penn.

able loss. As a result, various measures were discussed, and a contract was made for horses which were to be on hand when needed, but kept by the owner, the impracticability of which arrangement was demonstrated by the next fire, at the time of which the horses were some miles away.

This plan was thereupon abandoned, and an investigation of motor apparatus begun, which has resulted in the purchase of the special type A combination, manufactured by the Martin Carriage Works, York, Penn., and illustrated herewith. This truck has a four-cylinder, 80-horsepower Wisconsin motor, giving a speed of 30 miles an hour, with Brown-Lipe transmission and chain and sprocket final drive. The wheelbase is 158 inches and it has a 60-inch tread front and 63-inch rear, with 36 by four-inch and 40 by four-inch tires respectively. The ignition is dual, Bosch and Atwater Kent, and a North East motor-generator is used for starting, charging and lighting. The lamp equipment consisting of two 12-inch electric searchlights, two large combination oil and electric

dash lights, one combination oil and electric tail light, and a 10-inch swivel dash searchlight, a trouble light with dash connection being also provided.

The fire fighting equipment consists of two 35-gallon copper chemical tanks, of the Martin quick dumping type, with all connections, and 250 feet of $\frac{3}{4}$ -inch four-ply chemical hose with couplings, and one shut off nozzle with two tips; two hand extinguishers, with straps and shut off nozzle, carried in holders on the rear step; one 20-foot rapid rope hoist extension ladder, and one 12-foot roof ladder; a full equipment of axles, poles, bars, etc., together with lanterns and wrenches.

PRINCETON HAS NEW MOTOR CHEMICAL.

Engine Company No. 1, Princeton, N. J., has just added to its equipment a hose wagon and chemical, manufactured by the Martin Carriage Works, York, Penn. This is a direct indorsement of motor apparatus by the men of the department as, while the borough owns the fire stations, the companies themselves own the equipment. Company No. 1, which was organized in 1817, occupies one of the best houses in that section of the state, and the new chemical gives it a most efficient and up-to-date apparatus. The truck is described by the manufacturer as having a 46-horsepower Wisconsin motor, Brown-Lipe

transmission and chain and sprocket final drive to rear wheels. The wheelbase is 140 inches; the tread is 58-inch in front and 61-inch in the rear. A North East starting and lighting system is used, with a Bosch magneto and Atwater Kent battery system for ignition. Full fire fighting equipment is furnished on the standard models, but it is understood that the tanks and hose reel used on the horse drawn apparatus in Princeton, which it supersedes, were installed in place of those regularly supplied.

THE COUNTY FIRE BRIGADE.

At the recent convention of the Pennsylvania State Firemen's Association, a plan for rural fire protection was presented by Chief H. F. Ferber of the Scranton department. Chief Ferber calls attention to the inadequacy of the usual methods of combatting fires outside of the cities and larger towns, and particularly in the case of forest fires which are both frequent and destructive. His suggestion is that county

fire brigades be organized and equipped with motor apparatus, housed at one or more stations located at the county seat and elsewhere, if necessary, and in charge of a paid force headed by a competent chief, who would be a county officer. The apparatus and houses would be owned by the county, but the two or three permanent men would be paid by the town where the station was located, although responding to fires in any part of the county. The plan has been commented on very favorably.

FIGURES FAVOR MOTOR APPARATUS.

The statement of the New Haven, Conn., fire department printed below, in which detailed figures are given showing the comparative cost of motor and horse drawn apparatus, is a very strong indorsement of the former. The first motor pump cost, for two years, \$711.54, as against \$1924 for a steamer and horses for the same period, the figures of the motor apparatus being as follows:

690 gallons gasoline.....	\$96.60
57 gallons oil.....	19.95
Two tires	150.00
Two tubes	24.00
New wheels and tires.....	240.00
Repairs on account of accident.....	180.99
Total.....	\$711.54

This does not include the saving in wages arising from the fact that the motor engine can be operated by one man, as against four for the steamer, and it is further explained that the items for wheels, tires and tubes, amounting to \$144, would have been saved if the apparatus had been equipped with cushion tires when purchased. It is said that the second motor pump was even more economical, the figures given showing that, from Jan. 1 to Sept. 12, it responded to 113 alarms, using 300 gallons of gasoline at a cost of \$42, with a small quantity of oil, and that there were no other expenses chargeable against it for the eight months.

HORSES ABANDONED IN CHICAGO.

The plans for the 26 new fire stations, which are expected to be authorized by the finance committee of Chicago, Ill., show no provision whatever for horses, and it is declared by Chief Thomas O'Conner that the city has turned its back on them forever. Funds are now available for eight new stations, and work will be commenced as soon as possible. The buildings are uniform in style, 30 feet wide and 60 feet deep, pressed brick being used for their construction, and the equipment to be thoroughly up-to-date in every particular.

MANY AUTOMOBILES OWNED BY CITY.

The bureau of municipal research, Springfield, Mass., has just compiled a list of automobiles owned by the city, the total number being 69. The fire department uses 25 pieces of gasoline apparatus and five

electrics; the department of streets and engineering, three trucks, four touring cars and four runabouts; the water department, five trucks, five touring cars and one runabout; the police department, three patrols, one touring car and one runabout; the park department, two trucks, one touring car and three runabouts; the school department, one truck and one touring car; the building department, two runabouts; the sealer of weights and measures, one runabout; the assessors and treasurer, one touring car.

BRISTOL, ENGLAND, HOLDS TEST.

The official tests of the new motor fire engine recently put into service in Bristol, England, are of interest as showing the capacity of this class of apparatus. One hundred feet of hose were used, and the test began with two deliveries with 1½-inch nozzles at a pressure of 140 pounds. Other tests, including two deliveries with 1¼-inch nozzles, followed, and all were pronounced entirely satisfactory. The engine is able to throw nearly 500 gallons of water a minute, and has a speed of 40 miles an hour.

FIRE DEPARTMENT FLUSHES STREETS.

Chiefly because of its motor fire apparatus, Jamestown, N. Y., is successfully carrying out a plan of street flushing by the fire department. The six companies alternate in spending three hours a day in washing down the streets with a special line of hose, and the crew so engaged is closely followed by a piece of motor apparatus, so that, in case of an alarm, the men may be taken direct to the fire.

CHAMPION HORSE TEAM SUPPLANTED.

The famous fire team of Council Bluffs, Ia., which holds the world's championship in a half-mile hitch race, and has won nearly all state tournaments for a number of years, has been sold to O. K. Laroque, chief of the Marion, S. C., fire department. Notwithstanding the admiration felt by the men of the company, motor apparatus has been purchased and the horses crowded out.

NEW POLICE AUTO FOR NEW HAVEN.

Bids are shortly to be asked on a new touring car for the police department of New Haven, Conn., this action being taken on request of Chief Philip Smith. The finance commission has set aside \$1200 for the purpose.

A 10-passenger, convertible body, mounted on the "four" delivery car chassis, has just been brought out by the Studebaker Corporation, Detroit, Mich., and demonstrators are now being delivered to dealers. The seats run lengthwise, and are collapsible, permitting the use of the car for baggage and other loads.

CORRESPONDENCE WITH THE READER.

Universal Joints—Driver, Meriden, Conn.

Why are universal joints used on a truck? What should be done with the Spicer joints to keep them in good shape? I would appreciate a sketch illustrating the joint.

Universal joints are utilized to provide a flexible coupling between a driving and driven shaft, and are

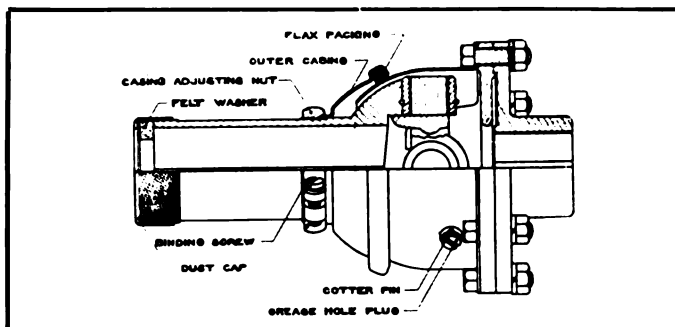


Fig. 1—Sectional View of Spicer Universal Joint and Illustrating Components Requiring Attention.

necessary when one of these shafts runs at an angle to the other.

For example: When the energy of the motor is conveyed through the gearset, located just behind the clutch, and from the transmission to the driving axles, that portion of the propeller shaft attached to the gearset is higher than that at the differential housing.

If means were not provided permitting the shaft to run at the angle required by the relative position of the differential and transmission, it would not be practical to attempt to utilize it to transmit power, as it would be subjected to bending stresses.

Generally, universal joints are constructed of metal, having a form of clevis or yoke at the end of each shaft to be joined. These clevises are at right angles to each other, and a cross, square or solid block is inserted between the clevis ends and secured with pins passing partially or wholly through the clevis ends and the block.

A universal joint, made by the Spicer Manufacturing Company, Plainfield, N. J., is shown at Fig. 1. If the car is new, the joint should be given attention, after 200 miles of service, by adjusting the outer casing. This member should not be too loose or too tight, as either condition will cause a loss of lubricant and result in heating. Looseness of the casing may be detected by rotating it by hand, as it will move freely. To adjust, loosen the binding screw and turn the casing adjusting nut until the outer casing is only so tight as to be rotated readily with both hands; then tighten the binding screw.

If the joint was properly assembled when fitted to the machine, the holes in the flanges and the outside casings will register so that, by removing the screw plug, the supply of lubricant can be renewed. If correctly assembled the oil hole will come opposite an open space in the joint, not opposite one of the lugs.

The maker recommends, when assembling the joint after cleaning, the use of a small quantity of

first-class steam cylinder oil, one that is of light enough body to run freely at atmospheric temperature. The amount should be sufficient to drench the entire inside of the joint when rotated. The joints should be run a minute or two with one rear wheel jacked up. Another method of lubrication is to pack the joints with soft grease, after which about half a pint of cylinder oil is introduced through the grease plug hole. The above suggestions apply with equal force to the slip joint.

Adjusting Bearings—A. K., Yonkers, N. Y.

Kindly advise me how to adjust the main bearings of the two-cylinder Maxwell. We use one for delivery purposes, and lately the engine is pounding.

The machine referred to doubtless is the model H, and a cross sectional view of the crankshaft bearing is shown at Fig. 2. As may be noted, it comprises two babbitt lined bronze boxes, indicated at A in the drawing, and two steel wedges, these components retaining the crankshaft B in place. On the bottom of the transmission case, directly under the flywheel and back of and under the second bearing, are set screws having locking nuts. Each bearing has two of these members.

To adjust the bearings, first loosen the lock nuts. Next turn the set screws to the right, which will force the wedges upward, bringing the bronze members A closer together. While the adjustment is made easily, it requires care, as one not experienced in the work of adjusting bearings is likely to tighten one side more than the other and to set the wedges up too snugly. The following suggestions will be of value:

Remove the spark plugs to relieve the compression and so that the flywheel may be rotated easily by hand. Next, loosen the four lock nuts, but do not disturb the adjustment of the set screws.

The front bearing should be adjusted first. Tighten one of the screws, and the other a like amount, noting how many complete or partial turns are given. Ro-

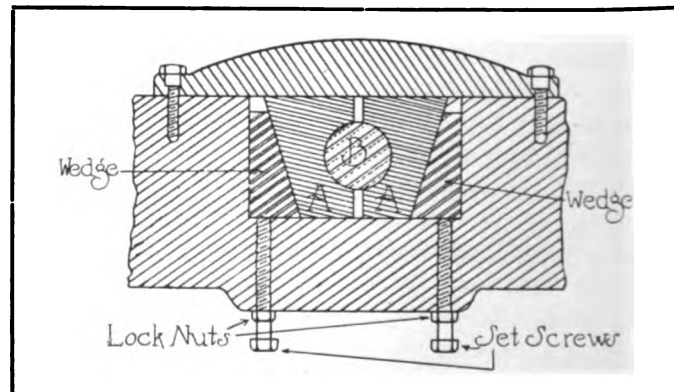


Fig. 2—Showing the Main Bearings of Maxwell Two-Cylinder Car and Components Utilized in Eliminating Play.

tate the flywheel and continue to take up on the screws until the bearing begins to bind, then slack off and try for what the expert terms the "feel" of the

bearings. The bearings should not bind. They should be adjusted until they appear to turn slightly hard, then slacked off about an eighth of a turn on the set screws. The same method should be employed with the other set screws.

By rocking the flywheel back and forth, one should be able to detect the snugness of the bearings. If one is set up too tight, both will work loose, and too loose an adjustment will impose undue wear upon the connecting rod bearings. After making all necessary adjustments the lock nuts should be set up tight.

It is advisable to use plenty of oil in the crank case until the bearings are worn in.

CLASSIFICATION OFFICIALS CONFER.

The entire uniform classification committee of the various railroads, and the traffic committee and the traffic manager of the National Automobile Chamber of Commerce, visited the Detroit automobile factories recently, this being a preliminary conference on the matter of automobile loading and weights.

This meeting is of particular importance, as the uniform classification committee will rewrite the classification of automobiles and parts as to package requirements, minimum carload weights, articles on which carload ratings will be granted, etc. Its recommendations will undoubtedly be adopted by railroads in the western, southern and official classification territories, to take the place of the separate classifications now prevailing.

The dunnage allowance of 500 pounds a carload has been discontinued on all freight, including automobiles, and the railroads now propose to charge \$1 a vehicle on automobile carloads.

SAFETY FIRST IN GOODYEAR PLANT.

The record of the first year of the Safety First movement in the plant of the Goodyear Tire and Rubber Company, Akron, O., shows that accidents of all sorts, both serious and minor, have been reduced one-third. Plans are being made for an even more rigid inspection, and it is expected that this excellent record will be surpassed the coming year. The men, who were at first skeptical, have now become enthusiastic and are co-operating with the safety engineer in every way, making possible a very high degree of effectiveness in this rather unique work.

GENERAL ELECTRIC STARTERS.

The General Electric Company, located in Schenectady, N. Y., and other cities, is about to put on the market a line of electric starters for automobiles, the sales to be handled through the A. J. Picard Company, New York City. The first type to be offered is understood to a single-unit design for Ford cars, which will be sold at a moderate price.

BOSCH ANSWERS SPLITDORF.

Defendant in Magneto Patent Suit Denies Infringement of Plaintiff's Rights.

The Bosch Magneto Company, which is the defendant in a suit recently filed by the Splitdorf Electrical Company of Newark, N. J., in the United States court for the Second District of New York, in which infringement of United States patent No. 1,074,416 is alleged, has filed an answer in which it denies that it has infringed the rights of the complainant, maintaining that the patent on which the complaint is based is invalid. Admitting that the patent was issued, the claim is made that issuance was not in accordance with United States statutes then existing; the defendant company denies that it has infringed or threatened to infringe the patent, that it has received any gains or profits by any infringement, or that it has caused the complainant any damage. Further claim is made that John M. Dinkins and Franklin B. Hays were not the original inventors of the device patented, and that every part was in use previous to the alleged invention, or more than two years previous to the application for the patent. Two French and two German patents are cited in support of this claim, and assertion is made by the Bosch Company that the state of the art of magneto ignition was such that there was nothing new or patentable in such an alleged invention, and for this reason the invention was not patentable according to the laws of the United States; further, that the defendant is ready to prove this state of the art. Contention is made that the plaintiff has no right to further answer to its bill of complaint, and the defendant asks that the bill be dismissed.

SIGNAL ADDS NUMEROUS AGENTS.

The Signal Motor Truck Company, Detroit, Mich., announces that the following agents have been added to its list: B. N. Beedon, Battle Creek, Mich.; Curtis Brothers, Cleveland, O.; Inter-Mountain Auto Truck Company, Philadelphia, Penn.; Burkhard Brothers, St. Joseph, Mich.; Waterhouse-Sands Motors Company, Seattle, Wash.; Osen & Hunter Auto Company, Oakland, Cal.; H. J. Tucker, Vancouver, B. C.; A. J. Sanderson, Buffalo, N. Y.

BUSINESS CONDITIONS GOOD.

A marked improvement in business conditions throughout the southwest and in the Pacific Coast territory is reported by C. A. Emise, sales manager of the Chandler Motor Car Company, Cleveland, O., who has just returned from a 30-day trip covering 16 states. He says that he found business to be practically normal, and the outlook for the coming season most favorable.

RECEIVER IS ASKED FOR.

Stockholder of United States Motor Alleges Waste of Assets.

On the ground that the assets of the company were wasted, and that the method of conducting the business was so changed as to force a receivership, Emanuel Metzger, a stockholder of the United States Motor Company, has filed notice of a complaint and summons, in which he prays for the appointment of a receiver by the supreme court of New York. Besides the company, a considerable number of persons, who were directors of the corporation at the time of the acts complained of, are made defendants. In September, 1912, the United States supreme court appointed receivers, but Mr. Metzger alleges that this was deliberately brought about by the defendants with the intention of wrecking the company.

'BUS SERVICE IN ADIRONDACKS.

One of the most convincing indications of the value of the motor vehicle for commercial passenger transportation is the use of motor omnibuses in the Adirondack region of New York. The deep sand and rough mountainous roads had been thought to present difficulties too great to be overcome by the automobile, but this has been disproved, and most of the resorts have, within the last two years, motorized their equipment. Another motor service, which is conspicuous because inaugurated only after strong opposition on the part of the railroads had been overcome, is that between the Otisco crossing on the Auburn, N. Y., trolley, and Fitzgerald point on Otisco lake, a distance of 15 miles for the round trip. A Palmer-Moore 14-passenger omnibus, equipped with Motz cushion tires, is used, averaging six round trips, or 90 miles a day.

NEW OMNIBUS SERVICE.

Having found that there is a demand for passenger service to the outlying sections of Danbury, Conn., J. W. Rutherford, proprietor of an automobile omnibus line, has inaugurated a regular service over a route covering Beaver Brook and Germantown, and making a detour on one of the afternoon trips to include the Danbury hospital. Three trips are made on every week day, with an extra one on Saturday night at 9:30.

HANDLE KOEHLER TRUCKS EXCLUSIVELY.

The H. J. Koehler S. G. Company, New York City, has discontinued handling the Grant motor car, and will devote its attention to marketing Koehler one-ton truck, built at the Newark, N. J., factory. Koehler

truck sales, having grown to a large volume during the past four years, makes it evident that, with the constant increasing demand for trucks and the additional support of the company's entire organization, its output should be almost doubled during 1915.

H. J. Koehler retains his stock holdings in the Grant Motor Company, Findlay, O., and remains a vice president and director.

POPE ASSETS SHRINK.

The assets of the Pope Manufacturing Company, Hartford, Conn., show a shrinkage of approximately \$500,000, according to the semi-annual report of Receiver George Pope, recently filed. This is partly due to the fact that the depression in business, resulting on the European war, has made the profitable liquidation of the property in his hands exceedingly difficult. The expense of carrying the property has been large, and the payment of a 10 per cent. dividend, amounting to \$160,665, covers a considerable part of the decrease in cash since his last accounting. Sufficient funds are now in hand to permit the payment of a dividend of five per cent., if the court so orders.

KISSELKAR OUTPUT FOR 1915.

The output scheduled by the Kissel Motor Car Company, Hartford, Wis., for 1915, is the largest in the history of the company, and includes four models of pleasure cars, one of which has not yet been announced, and six commercial chassis, all of which will be exhibited at the New York and Chicago shows in January.

MOTOR CARS FIGHT FOREST FIRES.

The use of motor cars in fighting forest fires this season has proved economical and efficient, notwithstanding the fact that the cost for the actual time employed has been higher than for horse drawn vehicles. The saving in time and the consequent promptness in handling the fires has more than offset this difference in rates.

WANT TRUCK DRIVERS EXAMINED.

At the Industrial Welfare and Efficiency conference, which was held recently at York, Penn., was discussed a proposed act which would require the drivers of motor vehicles to take an examination before an examining board. The idea met with approval, although it is understood that no definite action was taken.

MANY SIGNS ARE SENT OUT.

The Studebaker Corporation, Detroit, Mich., is furnishing its dealers all over the country with signs, thousands of which, of all sizes and kinds, are being sent out.

AMERICAN AMBULANCES VERY EFFICIENT.

THE service rendered by motor truck ambulances is a conspicuous feature of the present European conflict. The rapid means of transport that is so essential in order to save the lives of the wounded and sick is adequately furnished by the motor vehicle.

American made motor ambulances especially are establishing a remarkable record for efficiency and durability, and foreign correspondents are liberal in their praise of these vehicles. The immediate demand for ambulances was so great that it was necessary for various governments to adapt other types of vehicles for use in the field.

Surgical Vans.

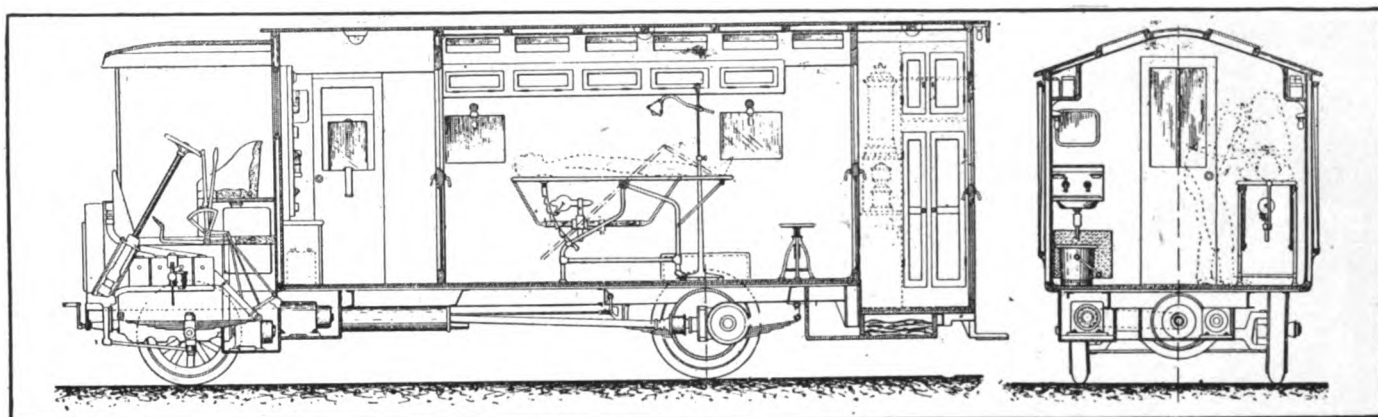
However, the majority of the ambulances in service are of the so-called perfected type. A motor surgical van is being made by the Schneider Company which is rated to be one of the most useful wagons yet designed for the Red Cross work. It is stated that many lives are saved daily by this car, which en-

bodies that are divided into three compartments. The forward division contains the electrical apparatus, the middle is the operating room and the rear section houses the radium apparatus.

The chassis is lighted by roof windows and dome lights, and the operating table, located in the centre apartment, is well taken care of in this respect. The forward compartment apparatus will sterilize 15,000 liters—approximately 2000 gallons—of water a day by ultra-violet rays. At either side of the chassis are folding tents. It will travel 18 miles an hour.

Necessity of Sanitary Corps.

It has been apparent from the outset of the war that careful sanitary supervision of the forces would be most essential. Consequently, special corps have been organized to cover each section of the armies to safeguard the health of the troops by requiring strict observance of regulations and special orders. These squads are furnished with specially equipped motor



Arrangement of an Exceptionally Well Equipped Surgical Motor Ambulance Truck That Is Being Manufactured by Schneider.

ables the surgeons to operate instantly without conveying the wounded to the hospital. The surgical van is completely equipped as an operating room and, in addition to the operating table, includes a sterilizing plant, electrically driven instruments for drilling, sawing, trepanning, X ray apparatus for locating bullets, and a radiography plant for tracing in broad daylight bullet wounds or the outlines of any organ of the body.

Likewise there is a plant for sterilizing, by ultra-violet rays at the rate of 600 liters an hour, all the water used. The operating truck contains a separate compartment where the surgeon can make a complete toilet before performing an operation. On each side of the van is carried a tent, which can be let down or folded up in five minutes. Each tent covers about 26 square meters, and has transparent panels in the sides, enabling them to be illuminated at night by powerful lamps placed in the side windows of the van.

Boulant Motor Field Hospital.

A motor ambulance of similar design is the Boulant field hospital, which is shown in the accompanying photographic illustration. These consist of an exceptionally long motor truck chassis fitted with wide

vehicles that are provided with such supplies as may be desirable. They have greatly minimized the danger of sickness and their expert knowledge and efficient equipment should come in for high praise when the complete story of the war is written.

Designs Vary.

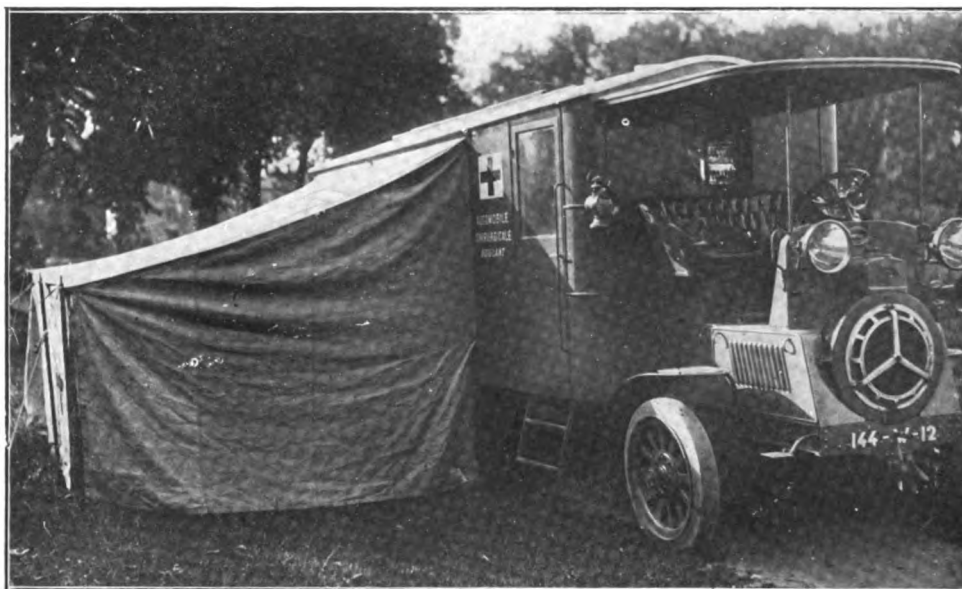
To revert to the more or less regular motor ambulances, it is seen that the various makes differ considerably in body design, capacity and stretcher arrangements. However, an analysis of the situation shows that the one aim has been to give the greatest possible comfort and to eliminate jolts as much as possible. These requirements have led to the adoption of various methods for loading and unloading the stretchers, and also for suspending or otherwise supporting them to minimize shock and vibration when travelling. The majority of military motor ambulance vehicles are of the two-stretcher or four-stretcher type, the bodies being so arranged that the stretchers can be loaded from the rear end. In the two-stretcher type, one side is occupied by a seat for attendants or men only slightly wounded. In some cases, however, the body is designed for the stretchers to be loaded

from either side and, in this connection, an interesting arrangement adopted by the French and Belgian armies is pointed out.

Revolving Stretcher Arrangement.

Between suitable supports, at the front and rear ends of the body, is supported a revolving frame work carrying four stretchers, which are suspended so that they are always in a horizontal position and, by revolving the frame, each stretcher comes into position to receive a wounded man from the side of the vehicle. When the four stretchers are occupied the frame work can be locked and held stationary.

A large number of Fiat two and four-stretcher ambulances are doing heavy duty in all the armies. The two-stretcher vehicle is mounted on a 12-15 horsepower chassis ordinarily fitted as a Fiat two or four-seated touring car. In the ambulance service it accommodates three wounded persons, two on stretchers and one on the tilt seat, which is extra long. The four-stretcher type is carried on a 15-20 horsepower



**Field Hospital on a Motor Truck Chassis, Showing the Equipment Ready for Service—
This Outfit Is Being Employed by the Allies.**

chassis, and there is sufficient room between the stretchers for the attendant to perform his duties while the vehicle is travelling.

ENGLAND'S TRADE WITH FRANCE.

As the result of the war, England and France are preparing to cement their commercial and industrial trade relations. A British firm, manufacturing component parts for automobiles, has received a letter from its representative in France which gives a side light on the attitude abroad. This writer says: "The present war will completely change European commercial and industrial business. With regard to France, there is no doubt that German business men will lose the important position in France which they have built up, and a great part of this business will certainly be acquired by English firms, to whom the French nation will be indebted."

TRACTOR PLOWING IN AUSTRALIA.

Motor plowing is making rapid progress in Australia, and it is recognized that larger crops will be handled during the next few years. It should be pointed out to American manufacturers that the stock of implements on hand in the Australian warehouses is said to be very light. One firm reports a sale of 60 motor plows since the first of the year.

MOTOR SERVICE IN TASMANIA.

The government railway department in Tasmania is maintaining an excellent motor service between Zeehan and Strahan.

TRUCKS IN NEW ZEALAND.

The stories to the effect that a manufacturer need only ship his motor trucks to New Zealand in order to reap an immediate harvest, is considerably modified in a statement of G. Hamilton Grapes, A. M. I. A. E. Mr. Grapes says: "The very reverse is the case. Though we are, in our cities and towns, now waking up to the advantage of motor traction for certain of our business activities, there does not exist a case here for the wholesale adoption of the standardized motor of commerce such as there is in countries like those of densely peopled Europe.

"Anyone acting upon such advice will assuredly not only burn his fingers, but still further retard the business motor

movement in this dominion."

However, with its ever increasing crops, Australia will offer an excellent field in future years.

SCANDINAVIA NOT SUPPLYING GASOLINE.

Erik Hildesheim of Copenhagen, most emphatically denies the statements to the effect that Germany is importing gasoline and other supplies by the Scandinavian route. He says that Denmark, as well as the other Scandinavian nations, Sweden and Norway, have prohibited the export of gasoline since the beginning of the war.

On Aug. 6 an act of parliament was passed forbidding the exportation of all goods useful to the belligerent countries, including coal, fire wood, gasoline, paraffin and other fuels, under penalties ranging from \$150 to \$3000, or imprisonment and the confiscation of the goods.

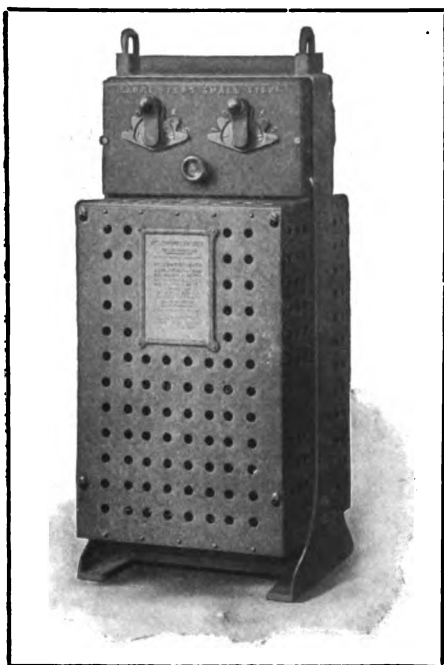
ELECTRIC VEHICLE PRACTISE.

The Variability of Battery Charging Amperage and Its Relation to the Use of Rectifiers with Differing Types of Cells--Some of the Characteristics of the Westinghouse Machines as to Control.

By William W. Scott.

MERCURY arc rectifiers are undeniably the most economical form of equipment for use where the number of vehicles in service is small, where the number of batteries is such that the charging apparatus can be used continuously, or nearly so, and where the machines are so worked that there is no demand for heavy boosting charges. With reference to the number of batteries that can be advantageously charged at any one time, everything depends upon the size of the cells and the amperage.

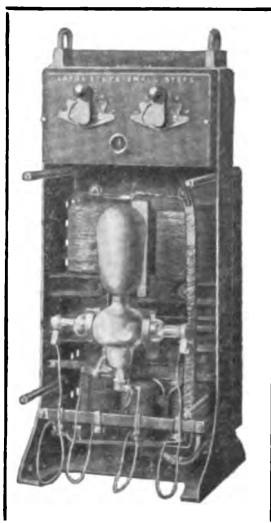
Generally speaking, the minimum line voltage is 110, and this is sufficient for a 44-cell battery. Obviously when a battery consists of say 20 cells, with a



Type AA Westinghouse Rectifier Outfit.

maximum voltage of 50 volts when fully charged, the difference between the line voltage and that required for completely charging cells must be lost unless provision is made for reducing it. The average lead-acid battery will absorb a large amperage for the first part of the charge, until it begins to gas or the temperature rises to what is known as the critical point, and usually this can be gauged by the appearance of gas or by the increase in the voltage. Examination of the cell charging rates of the cells produced by any one company will demonstrate that the rates do not greatly vary. For instance: The amperage of the Electric Storage Battery Company's cells for charge and discharge are exceedingly close. That is, the starting amperage of 29, which is reduced to 12 for the finishing rate, is the same for the Exide MV 11-plate cell, the Hycap-Exide MV 13-plate cell and the Ironclad Exide MV 11-plate cell, and these cells have normal discharge of 35 amperes for four hours, 33 amperes for five hours and 35 amperes for 4½ hours respectively.

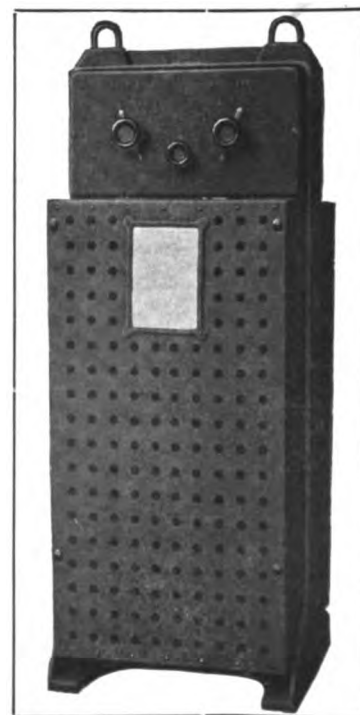
The starting rate of the Philadelphia type W 13-plate cell is 42 amperes, which is reduced to 11 amperes to finish the charge, and this cell has a discharge rate of 42 amperes for four hours; the Philadelphia type WM 15-plate cell and the type WT 19-plate cell are charged with starting rates of 40, which is reduced to 10 to finish, and these have discharge rates of 39.2 amperes for five hours and 40.5 amperes for six hours respectively; the Philadelphia type WTX 19-plate cell is charged at 38 amperes to start and 10 amperes to finish, and has normal discharge rate of 38.5 amperes for six hours.



Type AA Westinghouse Rectifier with Cover Removed.

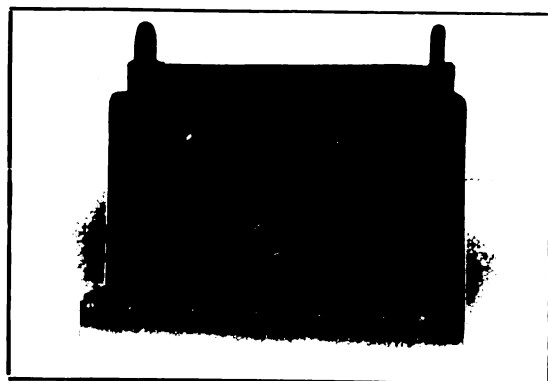
These are normal figures, based on the eight-hour charge and discharge standard, and theoretically they are the most economical and satisfactory for endurance and service, but boosting lead-acid batteries is maintained to be practical with any amperage that the batteries will absorb up to the point where gassing is begun, or where the temperature is not excessive. But to charge the cells to capacity, after the absorption of current to the gassing point, a continuance of the current at a correspondingly low rate is necessary.

The mercury arc rectifier is not adapted for such charging as has been suggested—boosting, or quick absorption of large amperage at the beginning of a charge—and for this reason they are decidedly dependable and satisfactory for the work for which they are adapted, and by con-



Type AE Westinghouse Rectifier.

necting in parallel a greater range of operation can be obtained by additional units. The batteries themselves can be charged in series-multiple, and this will



Dial Switches and Starting Knob.

allow an experienced electrician to do work that would be beyond the capacity of the

average vehicle owner or operator to perform. When direct current is not available and rectification is necessary, the principal problem is to determine whether mercury arc rectifiers will be the more economical, and the basis on which judgment is made must be the time available for the charging. After this the other factors can be considered. If the desire is to charge the batteries at night, without attendance, certainty of control is of material importance, and this can be assured by the use of automatic control, which can be so adapted as to safeguard the batteries against possibility of overcharging.

Considering the possibilities with mercury rectifiers for economical use with vehicle units, when one machine is in service, the rectifier that will have sufficient range to charge a battery of much larger size than is used is a good business proposition, unless the vehicle is a pleasure car, because if the machine is increased in size a rectifier of greater capacity may be necessary. Thus, instead of the 30-ampere rectifier, one of 50 would be the better, although a 40-ampere machine would be a very practical unit. Were another vehicle

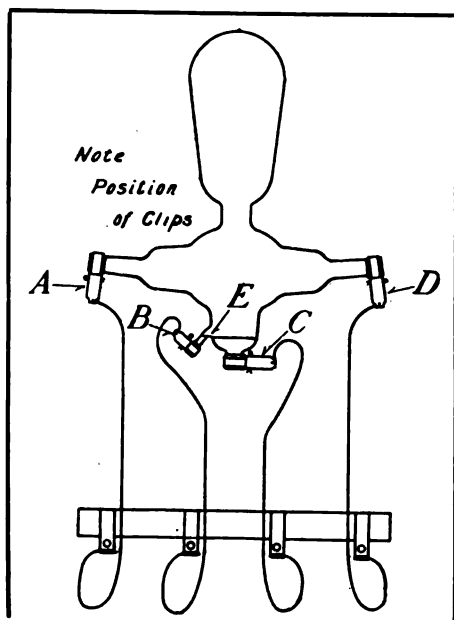


Diagram of Westinghouse Bulb and Connections.

purchased a second rectifier, connected in parallel by adding two reactances, would provide for all requirements. For the private garage, which has been referred to in the statement just made, this equipment is ideal, in that the fullest economy obtains and a material saving is made in the current that

would ordinarily be consumed in going to and from the garage.

The owner of the wagon or truck has a very different proposition, because the batteries are larger and greater regularity of attention is demanded. Not only this, there is the necessity of the periodic overcharge to insure the reduction of the sulphate accumulated on the plates. This can only be given when the battery is under observation, but provision can be made to obtain this so that practical results can be secured.

Should there be any considerable increase of numbers of machines, so that there will be economy in the use of other equipment, very useful service can be obtained from the rectifiers, this applying to the garage in which wagons or trucks are stored. By this is meant that after their capacity has been outgrown they will not be a sacrifice, for the uses that can be made of them will much more than compensate for the investment.

What will best parallel the demands of the owner of service vehicles, is the public garage where the number of machines given attention is reasonably uniform. That is to say, at the start a single

50-ampere capacity rectifier, or possibly two, can be installed, which will provide for one or two batteries. Should a third

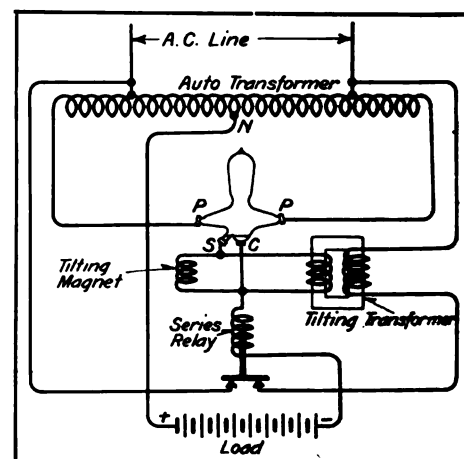


Diagram of Connections for Automatic Starting.

vehicle be purchased a third rectifier can be added, and this can be continued until from four to six rectifiers are in use, with the circuits arranged in series-multiple. Only the largest types of trucks require amperage at the start of the charging in excess of 50, and by judicious arrangement of the batteries very satisfactory and economical results can be obtained.

As the rectifier installation can be made sufficient for from four to five trucks, having lead-acid batteries, before other equipment will be the more satisfactory, a garage that will be sufficient for a transportation department of considerable proportion can be equipped with certainty of satisfactory results. Of course the proposition is not so easily dealt with when Edison batteries are used, because of the necessity of maintaining a higher rate of amperage throughout the charge, for the efficiency of the batteries must be kept to a standard, but unless boosting is required the charging could be done by careful attention to the arrangement of the batteries in series-multiple.

Statement has been made as the necessity of starting the charging of the Edison alkali nickel iron cells

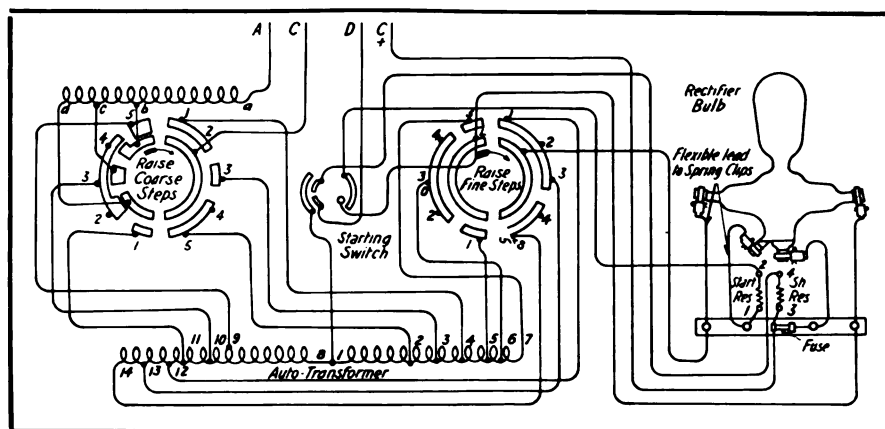


Diagram of Wiring Connections, Type AN Westinghouse Rectifier, 20 to 44 Cells, 110 Volts.

at a comparatively high amperage and maintaining it through the charge with as little diminution as is practical, and this method has been found to be proven in all conditions of operation. The Edison cells are made in nine different sizes, and of these six are used for vehicles, usually with 60 cells to the battery when used for wagons and trucks, and occasionally with 66 when unusually large capacity is desired. The cells are known as the A type, to differentiate them from the smaller sizes designed for ignition and vehicle lighting or starting, and they are classified according to size as A-4, A-5, A-6, A-8, A-10 and A-12.

While a separate installment will deal with Edison batteries specifically, some of the characteristics of the cells with relation to charging are of decided interest here, and especially with reference to rectification, because of the high rate that is necessary. This had best be shown by the following tabulation, with reference to charging and discharging:

	Types—					
	A-4	A-5	A-6	A-8	A-10	A-12
Rates capacity, ampere-hours	150	187.5	225	300	375	450
Normal actual output (7-hour charge) ampere-hours	168	210	252	236	420	504
Normal actual output (7-hour charge) watt-hours	202	252	302	403	504	605
Average voltage, discharging at normal (5 hours) rate...	1.2	1.2	1.2	1.2	1.2	1.2
Normal (5 hours) rate of discharge, amperes	30	37.5	45	60	75	90
Normal (7 hours) rate of charge, amperes	30	37.5	45	60	75	90

From this one will learn that three of the sizes, the A-8, A-10 and A-12, are too large to be charged with rectifiers unless the machines are arranged in parallel, and to charge these two rectifiers of the largest capacity should be used. For this reason equipment that would serve admirably with lead-acid cells cannot be utilized to good advantage, and consequently a garage that has to deal with Edison batteries must be specially equipped, although when these cells are used in pleasure vehicles in smaller groups they can be charged with the largest type machines.

The usual method of charging the Edison cells as has been explained, is

to start with amperage somewhat above the normal charging rate and to have the charge gradually tapered down until it is finished at the normal amperage. That is to say, that with the A-4 type the rate at the start may be as high as 37 amperes, and will be diminished until the last two or three hours the amperage is at 30. This is diametrically opposed to the conventional method of charging lead-acid cells, where the charge is started at approximately the normal amperage discharge rate and when the voltage indicates, or excessive gassing is evident, the amperage is reduced to a very low rate. Or, to put it another way, the Edison cell has the same rate of charge and discharge on the seven-hour rate, instead of the eight-hour normal rate of the lead-acid cell.

Theoretically, at least, the greatest efficiency of a cell can be obtained by charging and discharging at the normal rate, although the lead-acid cell can be given a charge at extremely high amperage until gassing or high temperature is noted, when the charging amperage must be reduced, but the Edison cell can be charged at a very high rate, and can be boosted at five times the normal rate for five minutes, four times the normal rate for 15 minutes, three times the normal rate for 30 minutes, and twice the normal rate for 60 minutes, the only condition being that the temperature does not exceed 115 Fahrenheit. Because of the extreme range of charging amperage, which will be 450 amperes for an A-12 cell for five minutes, 360 amperes for 15 minutes, 270 amperes for 30 minutes, and 180 amperes for an hour, charging apparatus of very large capacity is required. Obviously, rectification cannot be utilized save for the smaller sizes, and with the three largest cells the rectifiers must be arranged in parallel.

Of the mercury arc rectifiers in the market, those made by the Westinghouse Electric and Manufacturing Company have practically the same characteristics as those made by the General Electric Company, but

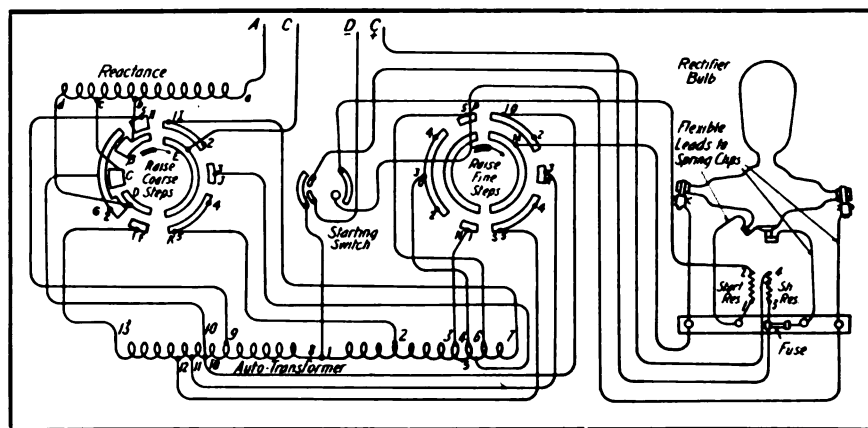


Diagram of Wiring Connections, Type AN Westinghouse Rectifier, 20 to 44 Cells, 220 Volts.

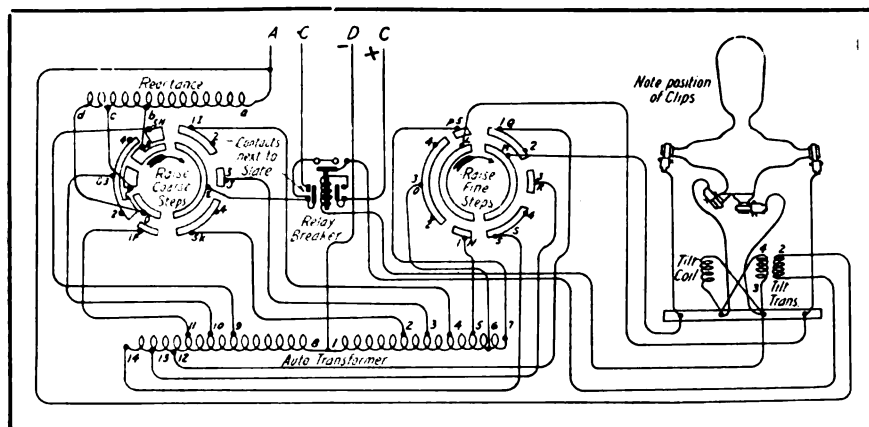


Diagram of Wiring Connections, Type AA Westinghouse Rectifier, 20 to 44 Cells, 110 Volts.

differ from them in the form of the tube used, as well as in the arrangement of the panels, though the principles are very similar. The construction of these machines is to designs that intend installation on floors or bases, as a glance at the illustration of a rectifier will show, instead of on frames, and generally these are provided with ventilated sheet iron covers that protect them and insure against danger. If rheostats are used, these must be located conveniently. Charging panels are generally separate, although instrument boards, each carrying a voltmeter and ammeter and a double-pole switch, are installed on the tops of the rectifier cases when desired.

There are six types of Westinghouse rectifiers, of which three are designed for vehicle battery charging. The non-automatic type is known as the AN, and this must be started and stopped by hand—started by tilting the bulb by the starting handle and stopped by opening the main line switch. With this type turning the starting switch to the starting position tilts the bulb and also completes the circuit through the supplementary starting electrode. A latch releases the bulb so that it will return to a vertical position. Direct current will flow through the shunt resistance until the switch is returned to the charging position, when the battery circuit is closed and the starting circuit opened.

The adjustment of the voltage or charging current is made by the two dial switches. One dial switch cuts out steps of the auto-transformer and the reactance in series with it, across the alternating current line; the other dial switch cuts in steps of the auto-transformer across the secondary circuit. Thus a part of the reactance is always in circuit with the primary circuit and this serves as a balance, raising the secondary voltage as the current diminishes. This type is primarily designed for lead-acid battery charging, and the reactance is so adjusted that the current tapers off considerably during the charge if the line voltage is constant and the regulat-

ing dial settings are unchanged.

The AA type of rectifiers have the same general features of the AN types, but have in addition tilting magnets, which provide for automatic starting, and relay circuit breakers. Turning the starting handle closes the circuit-breaker contacts and completes the circuit through the tilting transformer, which supplies current to the tilting magnet and the supplementary starting circuit. The current passes through the tilting magnet and tilts the bulb, so that the two mercury electrodes make contact.

This contact short-circuits the tilting magnet and allows the bulb to return to its upright position, which breaks the mercury path and starts the rectifier. When the direct current begins to flow, the cut-out coil is energized, and the tilting transformer circuit is opened automatically. Should there be failure of the alternating current voltage, which will stop the rectifier, the cut-out closes the tilting transformer circuit, so that the rectifier is in readiness to start itself when the voltage is renewed. Should there be excessive direct current the cut-out coil will cause the circuit breaker contacts to open.

The reactance of this type is so designed that it will give the charge necessary for the lead-acid batteries without changing the position of the dial switches during the charge, if the alternating current voltage remains constant. When correctly set the charging current will taper off from 30 amperes to about five or six amperes as the battery voltage rises. The user is advised not to depend upon this quality to terminate the charge, because of the uncertainty of the alternating current line voltage and the variations of the condition of the battery. This means that positive termination of the current, either by the hand switch or a time switch, is desirable. Should the circuit be opened by a time switch and the charge is found to be incomplete, it can be brought to the desired standard by supplementary charging for a short time.

The type AE rectifiers differ from the type AA machines in capacity and in that there is a small panel at

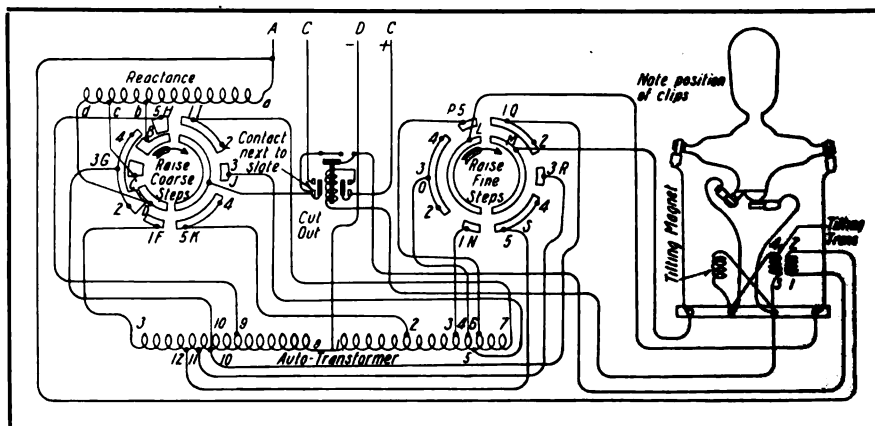


Diagram of Wiring Connections, Type AA Westinghouse Rectifier, 20 to 44 Cells, 220 Volts.

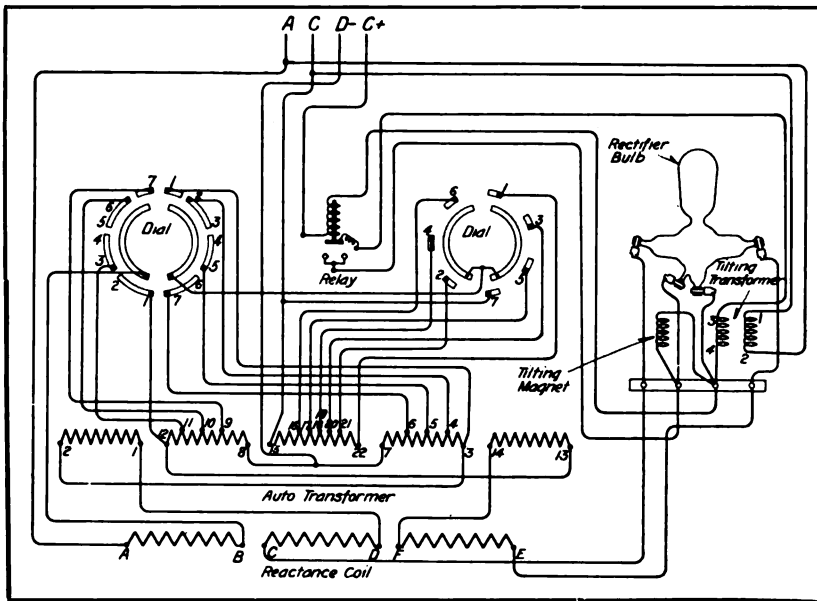


Diagram of Wiring Connections, Type AE Westinghouse Rectifier, for Charging Edison Cells, 110 Volts.

the top of the frame on which is mounted a direct current circuit breaker and fuse, and the alternating current switch and fuse. The dial switches each have seven contacts, so that close adjustment can be made. This type is intended for charging Edison cells, and the reactance is so proportioned that the charge may be started at 50 amperes and finished at from 30 to 35 amperes without changing the position of the dial switches. The charge is not automatically terminated, however, and the current must be cut off by the hand switch or a time switch.

The wiring diagrams of these three types of rectifiers, of the sizes that are designed for charging lead-acid batteries of from 20 to 44 cells, and Edison batteries of from 20 to 60 cells, from both the 110 and the 220 alternating current circuits are shown. While apparently these do not greatly differ from each other, one will note that the connections are varied for each size of machine adapted for different voltages. A good understanding of the wiring diagrams is desirable with any form of rectifier, for this will serve a very useful purpose in operating, because one can determine the cause of any ordinary condition that might adversely affect service and efficiency, by examination of the machine. Good adjustment is absolutely essential to satisfactory operation, and the inspection of a rectifier from time to time is advisable.

Note can be made of the general form of the machines, which are extremely compact and can be located in a space about 20 inches square and 48 inches high, so that they do not require more than a good foundation, where there is little dust, in practically any installation.

The illustrations shown of the recti-

fiers with the cases are of machines that are fitted with instrument panels. These are not as a rule supplied, because most of the electric vehicles in use today are equipped with instruments for measuring and indicating, but these panels are installed when desired. They each carry a type W voltmeter, a type W ammeter, and a double-pole switch. These panels will fit any type A machines and can be attached or detached at convenience.

The rectifiers as illustrated show the two regulating dials and the starting handle or wheel, all else being beneath the protecting iron cover. The "large step" dial, by which the "rough" regulating of the voltage is obtained, is at the left, and the "small step" dial is at the right. This equipment is necessary for all machines. The instrument panel, which is illustrated, is clamped to the top of the rectifier, slightly increasing its height. If a time switch is used this is usually located convenient to, but is not attached to, the rectifier. This is operated by a clock that is set to strike an alarm, which trips the mechanism of the switch and opens it.

The regulation of these rectifiers equipped with dial switches is approximately stated for varying loads and voltages by instruction cards, but in practise the switches are set at the lowest points at which the bulbs can be started, and further regulation is made when the tubes become warm.

(To Be Continued.)

The federal government has ordered, for use in the District of Columbia, 25 motor trucks, manufactured by the Gramm-Bernstein Company, Lima, O. They will be used in the City of Washington by the various governmental departments.

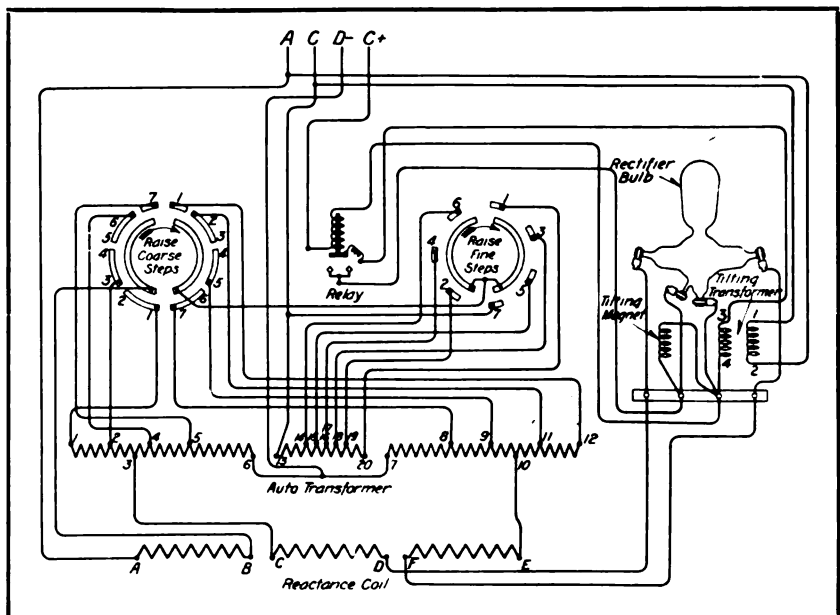


Diagram of Wiring Connections, Type AE Westinghouse Rectifier, for Charging Edison Cells, 220 Volts.

FIRE DESTROYS EDISON PLANT.

Thirty of the 35 buildings of the manufacturing plant of Thomas A. Edison, Inc., West Orange, N. J., were destroyed by fire on the night of Dec. 8. The loss is placed at \$2,000,000 by Mr. Edison. The fire originated in the testing room of the film department shortly before 6 o'clock and spread with such rapidity that the workers in several buildings had to leave their clothing to reach safety. Lack of water prevented efficient use of the fire apparatus called.

Despite the fact that the \$2,000,000 loss was complete, inasmuch as no insurance was carried, Mr. Edison was much gratified to observe the way the concrete walls withstood the explosions and flames. The buildings were completely gutted, but the walls are ready for refitting. It is stated that three months will be required to get things back to normal.

Henry Ford, president of the Ford Motor Company, Detroit, Mich., hurried to the aid of his friend, Mr. Edison, but the latter was in a cheery mood throughout the entire proceeding. The experimental laboratory was saved, and this is considered the most valuable of all things at the Edison plant.

It is stated that the business of the Edison Storage Battery Company will suffer no interruption whatever.

TIRE EFFICIENCY.

The mileage obtained with solid motor vehicle tires is a most important factor in transportation problems and owners of commercial vehicles will be interested in the guarantee given with Polack tires, marketed by the Polack Tyre and Rubber Company, 246 West 59th street, New York City. The company guarantees its product for 10,000 miles and states that it is invariably exceeded. The Polack tire is extensively used abroad, as well as in this country, and the company supplies some very interesting data on tires, which will be forwarded upon request.

OVERMAN TIRE COMPANY REORGANIZED.

The Overman Cushion Tire Company, New York City, has been formed to succeed the Overman Tire Company, which is in the hands of a receiver. The company will confine itself to manufacturing the cushion tire, and will not occupy the old plant in Passaic, N. J., the factory being located temporarily at Belleville, N. J., with storerooms and office at 250 West 54th street, New York City.

NEW ORDINANCE PROPOSED.

An ordinance to prohibit trucks and other vehicles backing up against the curbstone to unload will be proposed at an early meeting of the board of aldermen, New Haven, Conn., by the legislative committee of the New Haven Commercial Club. An effort

will also be made to secure the changes in the ordinances relating to the right of way at intersecting streets.

LOW-PRICED ELECTRIC CARS.

William E. Storms, formerly of the Anderson Electric Car Company, Ferdinand H. Zilisch, Milwaukee, Wis., and F. T. King, Detroit, Mich., have organized the Storms Electric Car Company for the purpose of building low-priced electric pleasure and commercial vehicles. Mr. Storms is designer and president, Mr. Zilisch vice president and Mr. King treasurer. The concern will locate at Detroit.

LARGE EXPORTS OF COMMERCIAL CARS.

The record of October exports of motor cars recently made public by the federal bureau of statistics, shows a total of 672 commercial cars, valued at \$2,286,964, and 732 pleasure cars, amounting to \$768,387, as against 79 commercial cars valued at \$129,506, and 1697 pleasure cars worth \$1,663,716, for the corresponding month last year.

SIGNAL DEALERS ADDED.

The Signal Motor Truck Company, Detroit, Mich., has added the following dealers to its list: The Huffman Automobile Company, Omaha, Neb.; Henderson Brothers, North Cambridge, Mass.; Stewart Motor Truck Company, Pittsburg, Penn., and G. C. Dugas, Atlanta, Ga.

FORM NEW TIRE CONCERN.

The idle plant of the Bucyrus Steam Shovel and Dredge Company, Bucyrus, O., is to be converted into a factory for the manufacture of motor vehicle tires. The work of remodelling the plant is said to have begun, and it is understood 1000 hands will be employed upon its opening, Jan. 1.

KISSELKARS FOR TRANSFER WORK.

The Kissel Motor Car Company, Hartford, Wis., is to supply to the Los Angeles Transfer Company, Los Angeles, Cal., 20 cars with taxicab bodies, and five with open tonneaus, all mounted on the new KisselKar 36-4 chassis.

GOVERNMENT BUYS DUPLEX TRUCKS.

The report that the Duplex Power Car Company, Charlotte, Mich., has received an order for a number of Duplex four-wheel drive trucks for the use of the United States government, has been confirmed by F. P. Town, president of the company.

SAXON BRINGS OUT A LIGHT DELIVERY CAR.

A LIGHT delivery car is one of the latest additions to the line of the Saxon Motor Car Company, Detroit, Mich. This new car, which has a carrying capacity of 400 pounds in addition to the driver, is stated to be the lowest-priced delivery car of standard design. The Saxon delivery car is equipped with a powerful four-cylinder motor, sliding gear transmission, dry plate clutch, shaft drive and standard tread.

Lawrence Moore, director of sales, says that much attention has been given by the Saxon engineers to securing simplicity of the control and operation, so that inexperienced drivers may have no difficulty in operating this vehicle. "The new Saxon delivery car is designed for the thousands who need motor delivery in their business, yet who have always thought of motor delivery cars as being expensive", says Mr. Moore. "After a long period of experimenting, we have produced a delivery car which costs no more than a good horse and wagon and at the same time has every advantage over horse delivery in point of distance covered, new business possible to handle, mile for mile economy and dependability".

The motor of the Saxon delivery is a four-cylinder, L head type, cast en bloc, with a bore of $2\frac{5}{8}$ inches and a stroke of four. The cooling is by thermo-syphon system, with a cellular radiator fan. The carburetor is a special Mayer, with adjustments for air and gas on the dash. Likewise the ignition switch is located on the leather covered instrument board, and further convenience is provided by making the spark control automatic.

The crankshaft is of special drop forged steel, and the transmission is of the sliding gear progressive type, with two speeds forward and reverse. A shaft drive is employed, this having one universal joint and concentric torque tube. A dry plate clutch is used of the five-plate design, with steel on Raybestos, and the two sets of brakes act on the rear wheels. The service brake has an eight-inch diameter, lined with Thermoid heat proof material, and the emergency has a $7\frac{11}{16}$ -inch diameter, steel on steel. Both the service and emergency brakes have a $1\frac{1}{4}$ -inch face. The operation is conventional.

The front axle is a single-piece drop forging, I beam section, and the rear axle is of the semi-floating type. The housing is of pressed steel, and the outer end of the drive shaft is carried on Hyatt roller bearings.

Ordinarily the new Saxon delivery body is open, but the equipment includes a top and storm curtains, which may be lowered to protect the load in inclement weather. The loading platform is low, making it extremely convenient for the driver to handle goods. The equipment includes a windshield, two gas head-

lights, an oil tail light, gas generator and bulb horn.

In putting this light delivery car on the market, the Saxon Company has added a type of vehicle that is capable of carrying a net load of 400 pounds, and will meet the needs of the business man who, in order to cope with the strenuous conditions of competition, must make deliveries and make them quickly.

The cost of the Saxon is approximately the same as the cost of a horse and wagon, and the cost of maintenance should be far cheaper. The light delivery car is ideal for the grocer, baker, florist, butcher, plumber, laundry man, electric light, gas and telephone companies, department stores and a myriad of other lines of business.

THERMOID BRAKE LINING.

Safety as well as economy with the heavily loaded truck demands that the brakes must work efficiently.



Three-Quarter Rear View of the Saxon Delivery Car Partially Loaded—It Has a Carrying Capacity of 400 Pounds, Exclusive of Driver.

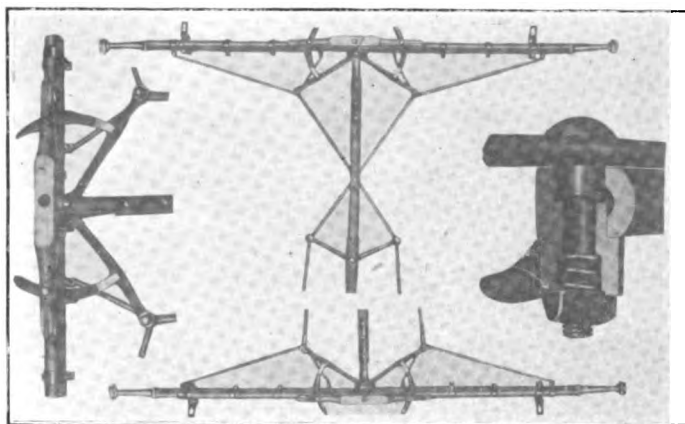
The selection of the brake lining, therefore, is important, and as the material is subjected to hard service, it should maintain the same high degree of coefficient of friction until it is worn very thin.

The Thermoid Rubber Company, Trenton, N. J., is producing Thermoid, the hydraulic compressed brake lining, which fulfills the above-named conditions, and the maker states that because of the hydraulic process its gripping qualities remain even when worn paper thin. Thermoid is not affected by heat, oil, water, gasoline or dirt, and the maker calls particular attention to its 100 per cent. efficiency. Thermoid brake lining is produced in sizes to meet all requirements. Details and prices will be supplied upon request.

The Mower Portable Automobile Garage Company, Seattle, Wash., will erect a new factory for the manufacture of portable garages for pleasure and commercial cars.

THE SIMPLEX AUTOMOBILE TRAILER.

A new automobile trailer which is said to supply the need for a vehicle which can be hauled by a motor car under all conditions of roads and traffic, is manu-



Detailed View of the Working Parts of the Simplex Automobile Trailer.

factured by the Simplex Short-Turn Gear Company, Anderson, Ind., of which G. A. Lambert, formerly of the Buckeye Manufacturing Company, is the head. The accompanying illustration of the gear and its component parts shows the simplicity of the device, which causes the wheels to track with the rear wheels of the car by which it is drawn. Many efforts have been made along this line for, as is well known, an ordinary four-wheeled cart, hauled by another vehicle, will cut across corners, never following exactly the turns made by the wheels of the tractor behind which it is attached. This makes its use out of the question except in open spaces, free from other traffic and, while a two-wheeled trailer is less troublesome, even this has the same tendency to a great degree. All of these troubles are avoided by the Simplex gear, which was invented and has been developed by Theodore Sandstrom, after many years of work. Two sizes are manufactured, one having a capacity of from 700 to 1000 pounds, being mounted on plain bearing 1000-mile axles, and the other, which is equipped with ball bearing axles and solid or pneumatic rubber tires, has a capacity of 1200 to 1500 pounds, at a speed from 20 to 30 miles an hour. Every effort has been made in the mechanical construction to avoid rattle, and to eliminate undue wear. The trailer is susceptible of many uses, one of which is suggested by the accompanying illustration, showing it hauled by a Saxon runabout. Merchants, contractors, farmers and persons in many other lines of business can use such a car to advantage, and its possibilities for heavy hauling have been suggested in the military equipment which is giving such good service in the European

war. The addition of a second vehicle, without independent motive power, increases the capacity of the power driven car without substantially adding to the cost of operation, and as there is no necessity for a larger crew, makes for the highest economy.

NEW HOME FOR ELECTRIC CARS.

The New York Electric Vehicle Association has taken a lease of the entire building at the southwest corner of Central Park West and 62nd street, New York City. The Central Park West frontage will be used as a salesroom for Rauch & Lang, Baker electric and Detroit electric cars. The balance of the building will be occupied as a central electric garage for the storing and care of electric vehicles.

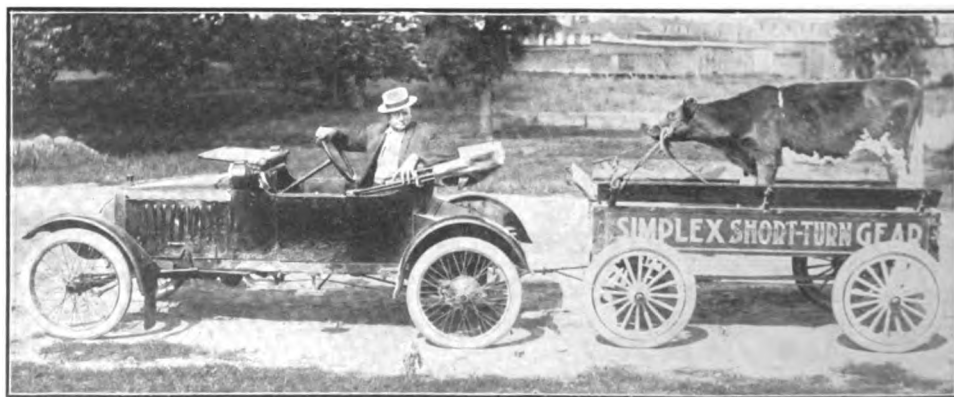
This plan has been contemplated for some time and the closing of the lease marks the opening of an extensive campaign in the Metropolis for the sale of electric vehicles.

CANADIAN MILITIA TO USE TRUCKS.

Commercial vehicles, ordered by the militia department of Canada and by individuals for presentation to the government, are keeping Canadian factories busy. It has been found that the vehicles so far sent for service in the field, have not been entirely satisfactory, owing to the fact that they have been armored on the sides but not on the top, which has been shown to be necessary in the operations of the present war.

CO-OPERATION AMONG DEALERS.

An appeal for co-operation among dealers in commercial vehicles in the small towns and cities has been made by Martin L. Pulcher, general manager of the Federal Motor Truck Company, who suggests that the type and model of car, which will best suit the purposes of a prospective purchaser, should be decided upon by the dealers, and the prospect advised to that



Simplex Automobile Trailer Does Not Require a Heavy Car or Truck for Successful Use.

effect. Mr. Pulcher believes that the demand for trucks will be increased by this method and that all manufacturers will get their share.

NEWS OF THE MANUFACTURER.

The R. I. V. Company, New York City, has just completed an additional shipment of a large consignment of ball bearings, the latest to arrive from Italy. This company has been fortunate, as Italy's neutrality has enabled it to continue regular shipments since the beginning of the war. One shipment, shown in the accompanying illustration, consists of bearings of sizes not usually carried in stock in New York City. The order was booked less than 30 days before the picture was taken, which speaks highly for the service rendered.

The Sevlson Electric Company, Elkhart, Ind., maker of motor vehicle fixtures, suffered a \$5000 loss from fire recently.

The Xenia Rubber Company, Xenia, O., is installing a new mill at its plant, which will more than quadruple its factory facilities.

The Westinghouse Lamp Company of New York, Milwaukee, Wis., has commenced operations in its new western plant in that city. This building was purchased several months ago from the Kissel Motor Car Company, Hartford, Wis. The new Westinghouse plant will have a monthly capacity of 600,000 Mazda lamps, and it is said that a considerable portion of these will be of the low-voltage type for motor vehicles. The plant is composed of five large buildings, and is located on the main line of the C. M. & St. Paul railroad.

The H. J. Koehler S. G. Company has moved its general offices from 1709 Broadway, New York City, to the Koehler building, 291 Halsey street, Newark, N. J. This location is in close proximity to the company's factory in Newark, where the Koehler one-ton truck is built. It is expected that this move will result in better co-operation and service for the agents.

The Zenith Carburetor Company, Detroit, Mich., has been admitted to membership in the Motor and Accessory Manufacturers, New York City.

The Kissel Motor Car Company, Hartford, Wis., announces that the following concerns have been appointed agencies for the KisselKar: Bert M. Norton, Napa, Cal.; George W. Spaulding, Jacksonville, Fla.; G. T. Peterson, Lanyon, Ia.; Bert A. Vance, New Bedford, Mass.; J. E. Jackson, Escanaba, Mich.; Garner Auto Sales Co., Flint, Mich.; Colonial Motor Car Company, St. Louis, Mo.; Ed von Kattengell, Red Bank, N. J.; Clapham & Hagan, Bloomingburg, N. Y.; B. F. Milson, Buffalo, N. Y.; Brunnell Auto Sales Company, Toledo, O.; Charles G. McCune, Columbus, O., and N. M. Snyder, Curtisville, Penn.

The Lovell-McConnell Manufacturing Company, Newark, N. J., maker of the Klaxon horn and other electrical appliances, announces the following changes in its sales department: W. H. Bendfelt, formerly of the Detroit office of the Western Electric Company, and P. C. Little of Boston, have been added to the Klaxon selling organization; W. G. Packard of the Klaxon service department has been transferred to the sales department to work in conjunction with R. G. Coghlan in the eastern territory; F. M. Hayes, who for the past two years has represented the Klaxon sales department in New England, has been assigned to the perfection and extension of the Klaxon service system in that territory.

A. C. Webb of Philadelphia, Penn., has been made manager of the commercial vehicle department of the New York City office of the Studebaker Corporation, Detroit, Mich.

Charles A. Smith, until recently owner of the Newark Lumber Company, Newark, N. J., has become general manager of the Blair Motor Truck Company, Newark, N. J.

The Marathon Tire and Rubber Company, Cuyahoga Falls, O., has appointed the following distributors for Marathon tires: Turner Electric Supply Company, Birmingham, Ala.; E. L. Taylor Company, Inc., Richmond, Va.; Frank Bros., Baltimore, Md.; Peerless Rubber Tire Company, Seattle, Wash., and Denmead Auto Supply Company, Akron, O.

The Commercial Automobile Body Company, St. Louis, Mo., has opened offices and sales rooms in that city. Hugh Cartwright is president and general manager of the company.

The Kelsey Wheel Company, Detroit, Mich., plans a \$40,000 addition to its factory. It will be of brick and steel, 255 by 80 feet.

H. B. Shontz has been appointed sales manager of Merritt J. Osborn, Inc., St. Paul, Minn., distributor of the Overland and White lines. Mr. Shontz was formerly sales manager of the C. T. Silver Motor Company, New York City, distributor

for the Overland and Peerless cars. For the past four months he has been factory representative of the Willys-Overland Company for the State of Minnesota.

The Baker Motor Vehicle Company, Cleveland, O., recently closed negotiations with the Wolseley Motors, Ltd., Vickers, Ltd., London, England, to represent it in England. Inasmuch as the condition in England is especially favorable for the sale of trucks at this time, the new agents expect to give special attention to these vehicles. At the present time they have in operation a number of Baker trucks as demonstrators.

T. G. Woods, formerly identified with the sales force of the White Company, Cleveland, O., in Boston, Mass., and in Providence, R. I., has been made commercial sales manager for the White Company in New Haven, Conn.

The J. C. Wilson Company, Detroit, Mich., has completed its first six motor wagons. The machines are of 1½ tons capacity, and employ the Continental motor, Sheldon axles, Detroit Steel Products springs and other standard parts.

The New Process Gear Corporation, Syracuse, N. Y., will erect a \$100,000 addition to its plant, consisting of two buildings, for housing the case hardening, carbonizing and sand blast departments.

Forrest E. Devine, Madison, Wis., inventor of a gang grinder for reseating valves in poppet valve engines, by means of which all of the valves of a multiple-cylinder engine may be ground at one time, is preparing for a large production of the appliance. The Devine valve grinding machine is designed



Part of a Consignment of Ball Bearings at the R. I. V. Company's New York Office—These Have Just Arrived from Italy.

primarily for garage use and its distribution for the immediate present will be through the jobbing trade only.

The Electromobile Company, St. Louis, Mo., announces that it is ready to make deliveries of its electrical industrial trucks. The company, which has offices in the Boatmen's Bank building, is capitalized at \$100,000.

The Maccarr Auto Truck Company, Scranton, Penn., will offer for sale \$24,000 in treasury stock in anticipation of new business.

The Columbus Welding Shop, Columbus, O., is the name of a new automobile repair company being operated at 294 North Third street, that city.

The Burnox Company, West Allis, Wis., has been organized to manufacture and market a chemical compound for removing carbon deposits in internal combustion engine cylinders. The incorporators are: Theodore Mueller, Paul Hunt and Charles E. Kubicek.

The Miller Rubber Company, Akron, O., reports a gross business of \$2,500,000 for the fiscal year ending Oct. 31, with net profits of \$528,000. The company declared its regular dividend of seven per cent. on the preferred stock, and has laid aside a sufficient sum to pay 10 per cent. on its common. The officers have been re-elected for the coming year, as follows: Jacob Pfeiffer, president; C. T. Grant, vice president; F. B. Theiss, treasurer, and William Pfeiffer, secretary and assistant treasurer.

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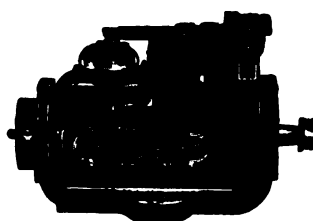
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